



## HIPPOCRATIC WISDOM



# HIPPOCRATIC WISDOM

*For Him Who Wishes to Pursue Properly  
the Science of Medicine*



A Modern Appreciation of  
Ancient Scientific Achievement

*by*

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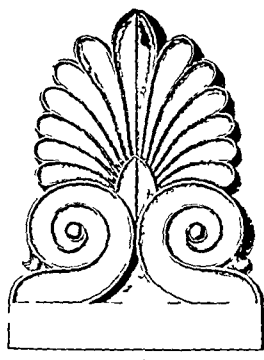
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GEORGE H COLEMAN AND SELIM W MCARTHUR

*In Friendship and Gratitude for the  
Years added to the Days*







## A Preface by Hippocrates

WHOEVER WISHES TO PURSUE PROPERLY THE SCIENCE OF MEDICINE MUST PROCEED THUS FIRST HE OUGHT TO CONSIDER WHAT EFFECTS EACH SEASON OF THE YEAR CAN PRODUCE, FOR THE SEASONS ARE NOT AT ALL ALIKE, BUT DIFFER WIDELY BOTH IN THEMSELVES AND AT THEIR CHANGES THE NEXT POINT IS THE HOT WINDS AND THE COLD, ESPECIALLY THOSE THAT ARE UNIVERSAL, BUT ALSO THOSE THAT ARE PECULIAR TO EACH PARTICULAR REGION

FOR KNOWING THE CHANGES OF THE SEASONS, AND THE RISINGS AND SETTINGS OF THE STARS (i e , the Greek calendar ), WITH THE CIRCUMSTANCES OF EACH OF THESE PHENOMENA, HE WILL KNOW BEFOREHAND THE NATURE OF THE YEAR THAT IS COMING THROUGH THESE CONSIDERATIONS AND BY LEARNING THE TIMES BEFOREHAND HE WILL HAVE FULL KNOWLEDGE OF EACH PARTICULAR CASE, WILL SUCCEED BEST IN SECURING HEALTH, AND WILL ACHIEVE THE GREATEST TRIUMPHS IN THE PRACTICE OF HIS ART IF IT BE THOUGHT THAT ALL THIS BELONGS TO METEOROLOGY, HE WILL FIND OUT, ON SECOND THOUGHTS, THAT THE CONTRIBUTION OF ASTRONOMY TO MEDICINE IS NOT A VERY SMALL ONE BUT A VERY GREAT ONE INDEED FOR WITH THE SEASONS MEN'S DISEASES, LIKE THEIR DIGESTIVE ORGANS, SUFFER CHANGE

## HIPPOCRATIC WISDOM

HIPPOCRATES wrote this preface over the portals of his medical edifice. The student cannot enter without reading this first page of Airs, Waters, Places.

Note the use of the word *science*. Medicine is a science to Hippocrates. It is not dogma, it is not mystery, it does not involve incantation or worship, or anything other than observation, examination, the recording of experience, action by trial and experiment, analysis and synthesis, and finally intuition as the all-encompassing wisdom of the great clinician. It is the study of the human being, of a particular phase, namely man's dysfunction, a subdivision of anthropology and of human ecology.

Note, too, the imperative *must*. He does not use the term "should" or "will" or "may" but this direct command *must proceed thus*.

Hippocrates was sure of his ground—weather came first. Then, the student must also consider the other environmental factors, such as water and soil, the mode of life to which the inhabitants are accustomed, whether they are heavy drinkers, whether they take more than one full meal a day, whether they are inactive or athletic, industrious, eating much and drinking little.



## NOTE

To facilitate reading, all direct Hippocratic quotations are in Roman Type without quotation marks. References and extended explanatory notes indicated by bracketed letters [Note A], a glossary, as well as notes on the illustrations have been provided in the appendix.

## CHAPTER I

# The Poles of the Earth



I Swear by Apollo the Physician

*Of which the sun, being over seer and warder, to determine, judge, appoint and declare the changes and seasons, which, according to Heracleitus, bring all things, is a helper of the leader and first God, not in trivial or small things, but in the greatest and most important*

*Heracleitus*

## *Weather—Season* *Erysipelas*

### *Synopsis*

*HIPPOCRATES AS THE WIDELY INTERESTED SCIENTIST (METEOROLOGY, ANTHROPOLOGY, ECOLOGY, MEDICINE) The clinical observation of the individual versus the mathematical approach*

*Weather Dependence of weather change on physical forces Universal winds Atmospheric fronts The equator and the poles Absorption of moisture from the tropical seas Maritime climates Fall winds*

*Significance of change for the human The effect of different air masses The constitution of the year, i.e., the intensity and sequence of the changes The effect of weather on the human and on the state of the organic world*

*Erysipelas as related to season The clinical picture Accentuation of certain diseases at different seasons Improvement by opposite seasons The value of biological rest in treatment*

**NOTES—Measure—Individuality and Science** *The Foehn Constitution Spring and the pH Levels of the Blood*

## HIPPOCRATES

*So we begin our Greek excursion. Despite the imperative demand of Hippocrates' preface, despite the encouragement of one of America's great medical scientists, it does seem a strange path to follow. Study weather and season first? Weather is such an everyday affair and commonplaces cannot possibly be concerned in the etiology of disease! Bacteria and viruses, parasites and poisons, allergens, vitamin lack or endocrine imbalance, congenital defects—yes, of course. But weather? Clearly Hippocrates must have been primitive, perhaps akin to the soothsayer!—He wasn't*

*He was the world's first 'meteorologist,' he introduced the name, indeed, he did more than that, he laid a framework for weather knowledge which, unfortunately, was not developed, though his basic concept was correct. He was more than that.*

*He was the world's first 'anthropologist.' He studied man as an objectively interesting phenomenon who differed from place to place and from time to time.*

*He was the world's first 'ecologist,' who put together his knowledge of the human as related to the place, to the food supply, to the water, to the occupation, to the social group, to the climate, to the weather.*

*He was the world's first 'scientist', his predecessors, the natural philosophers, speculated rather than observed. Hippocrates observed, drew deductions, and acted, he speculated but little.*

*In suggesting that Hippocrates may be acclaimed as the world's first scientist I should possibly qualify and say that he was the world's first scientist in the field of biology.\* Immediately the point will be made that he could not have been a true scientist because he did not use a mathematical approach. Only a mathematical approach will*

\* I believe that Dr. Jones (THE SCIENTIST'S PLAYGROUND, *Proc. Roy. Soc. of Med. Sec. Hist. of Med.* 1937, 111, 859), might take serious exception to this statement. In so far as I have made continued use of his excellent translation and greatly respect his opinion. I would urge the reader to read his most interesting discussion of the subject.

which cleanses, freedom from superstition, preexcellence divine This in opposition to intemperance, vulgarity, greed, concupiscense, robbery and shamelessness <sup>4</sup> *In view of the fact that the training of the youth of the upper classes was largely in the hands of the professional trainers in the palaestra, Hippocrates' stricture is of significance He wrote the trainer's art is of this sort they teach how to transgress the law according to the law (Hippocrates is referring to trainers, not lawyers), to be unjust justly, to deceive, to rob, to do the foulest violence most fairly He who does not these things is bad, he who does them is good This is a proof of the folly of the many They behold these things and judge one man out of all to be good and the others to be bad Many admire, and a few know Men come to the marketplace and do the same thing, men deceive when they buy and sell Who has deceived most is admired When drinking and raving they do the same thing They run and they wrestle and they fight and they trick and they deceive* <sup>4a</sup>



*The Trainer in the Palaestra*

## WEATHER

*Hippocrates did not know modern meteorology—that we can take for granted, but he knew very much more than do most Americans of today*

*He distinguished universal winds (i.e., cyclonic circulation of the atmosphere) from winds that were due to local causes* <sup>5</sup>

*He knew that the heat of the sun evaporated the water from the seas, leaving the brine behind* <sup>6</sup>



*This process of distillation (digestion, i e , separation and selection, in the physiological sense) permitted the moisture to rise in the atmosphere as it circles around, and travels about aloft. If this scattered or uncondensed moisture collects to form clouds and is then compressed owing to sudden, contrary winds, then precipitation occurs. For this is more likely to occur when the clouds set in motion and carried along by a wind that allows them no rest are suddenly encountered by a contrary blast and by other clouds. In such cases the FRONT is compressed and causes rain.<sup>7</sup>*

*Interesting that the term 'front,' established in meteorological nomenclature in relatively recent times, should have been used at its very inception!*

#### THE POLES OF THE EARTH THE PHYSICAL BASIS OF WEATHER CHANGE

*Consideration of the earth as a rotating sphere brings the sun nearer the equator, the effects of the sun would there be greater, Southern countries, as a result, are hotter and drier (the water being evaporated more readily) than the northern because they are nearer the sun.<sup>8</sup>*

*On the other hand, the north wind blows cold and moist because it blows from such (northern) regions. It is most cold to the inhabitants of such northern regions and least to those farthest from the north. But (because of the spherical shape of the earth) the south wind blows sometimes from places that are of the same nature as the north, for when the wind blows from the south pole and starts from so much snow, ice, and severe frosts, it must of necessity blow to those who dwell near it after the same manner as the north wind does to us. But it does not come the same to every country. For instance, when it blows through the approaches of the sun (in terms of Libya) under the south, the moisture is absorbed by the sun as it dries and becomes rare and therefore of necessity it must reach here hot and dry. Therefore in the most adjacent countries it must impart such a hot dry quality as it does in Libya where it parches the plants and insensibly dries up the inhabitants. For as it cannot get any moisture either from sea or river it drinks up the moisture of animals and plants. But when the wind being hot and rare has*

passed the ocean it fills the country where it strikes with much moisture<sup>9</sup>

*How did the Greeks know that the north pole and the south pole were lands of snow, ice and severe frosts? Speculation? The tales of sailors blown off their course in the North Atlantic when on voyages to the Cassiterides? At any rate, there is the clear description—the lands of snow, ice and severe frosts—the poles of the earth!*

*Naturally maritime climates are blessed with a milder climate because the vast area of the sea tends toward stabilization* islands which are near the mainland have very severe winters, but those which are further out to sea are milder in winter. The reason is because the snow and ice on the mainland remain, and send cold winds to the neighboring islands, but islands situated in mid-ocean have no snow remaining in the winter<sup>10</sup>

*We will follow the Hippocratic discussion of the effect of the changes in atmosphere in later chapters. Here for the moment I would merely anticipate by the statement that the powers of the winds (and then effects on the organic world) result from properties acquired in regions they have traversed.* Winds which strike regions from off the sea, or from snow, frost, lakes, or rivers—all moisten and cool both plants and animals and are healthy unless they are cold to an excess, when they are hurtful by reason of the great changes of cold and heat which they make in bodies<sup>11</sup>

### FALL WINDS

In places where mountains are situated to the south, the south winds that blow are parching and unhealthy, where the mountains are situated to the north, there northern winds occasion disorders and sickness<sup>12</sup>

The winds which must pass over mountains to reach cities do not only dry, but also DISTURB THE AIR which we breathe and the bodies of men, so as to engender diseases<sup>13</sup>

*Winds which pass over mountains! Again an amazing observation. The Canadian has the Chinook, the European, the Foehn, the inhabitant of the shores of the Adriatic, the Boia. Wherever fall winds are known, their association with the initiation of autonomic disturbance is recognized—particularly the Foehn has been the subject*

*of study [Note B] So well established is the effect on the mentality of the individual subjected to such change that in the law courts it has not infrequently served to excuse irrational and even criminal acts*

It is changes that are chiefly responsible for diseases, especially the greatest change, the violent alterations both in season and in other things. But seasons that come on gradually are the safest, as are gradual changes of regimen and temperature<sup>14</sup>

Of daily constitutions (*i.e., wind and weather*) such as are northerly brace the body, giving it tone and agility, and improving the complexion and the sense of hearing, dry up the bowels and make the eyes tingle, besides aggravating any pre-existing pain in the chest<sup>15</sup>

A north wind, for instance, causes cough, sore throat, constipation, difficult micturation accompanied by shivering, pains in the side and chest, such are the diseases that one must be prone to expect when this wind prevails<sup>16</sup>

Should its predominance be greater still, the fevers which follow drought and rain are determined BY THE CONDITIONS THAT PRECEDED THIS PREDOMINANCE, BY THE PHYSICAL CONDITION PRODUCED BY THE PREVIOUS SEASON AND BY THE PARTICULAR HUMOUR THAT PREVAILS IN THE BODY<sup>17</sup> Southerly constitutions relax and moisten the body, bring on heaviness of the head, hardness of hearing, and giddiness, make the eyes and the whole body slow to move, and the bowels watery<sup>18</sup> South winds cause deafness, dimness of vision, headaches, heaviness and are relaxing. When such winds prevail their characteristics cause men to suffer from disease. Sores are soft, especially in the mouth, the privy parts similar<sup>19</sup>

*Note the use of the term 'constitution' for the weather of the time. The environment had a constitution of a certain character, just as the human had a characteristic constitution. This dualism (again significant in emphasizing the integration of human and environment) becomes clearer in the use of the term "constitution" in the following aphorisms*

If the summer prove dry and northerly, and the autumn rainy and southerly, headaches are common in the winter, with coughs, sore

throats, colds, and in some cases, consumption<sup>20</sup> But if (*the autumn*) be northerly and rainless, it is beneficial to those with moist constitutions and to women To the others will come dry eye diseases, acute fevers, cold, and in some cases, melancholia<sup>21</sup> [Note C] Of the constitutions of the year droughts are, in general, more healthy and less deadly than wet weather<sup>22</sup>

### WINDS CHANGE THE BODY

Winds cause differences—and this too is important—in all other respects also \* For humours vary in strength according to season and district, summer, for instance, produces bile, spring, blood, and so on in each case<sup>23</sup>

*Here is the evidence of the obvious recognition of the conditioning of the organic world by the meteorological environment—not only by the weather of the moment or by the weather of yesterday, but by the weather of the month before or the year before! It is a correct observation If the autumn has been cold, the buffer levels in spring will be lower than normally, and resistance to disease will be diminished If the weather has altered the crop of the preceding summer, the diet and, in turn, the nutritional state of the population will reflect the weather The organic state, the organic rhythm is modified by weather of the moment and by preceding weather*

### SEASON AND ERYSIPELAS

*In Eidmann's recently published biography<sup>24</sup> he alludes, with proper scorn, to the old notion that erysipelas was caused by northeast winds, to illustrate the vast transition in medical knowledge from prebacterial days to our own Dr Eidmann is very right but just a little wrong Streptococci are the cause of the infection that we call erysipelas But these selfsame streptococci are more apt to cause the disease when the northeast winds blow! Hippocrates could not know of streptococci because he did not have the microscope, he could only get at one of the roots of this clinical entity*

<sup>20</sup> If the meteorological conditions are such that they are unfavorable, then they master the fluids of the body and they are either heated or cooled until a disease occurs If the fluids are once brought into equilibrium the patient recovers (DISEASES IV, *Littre*, Chapter 51)

*In view of the fact that Hippocrates first described erysipelas and named the clinical condition, he will tell the story. He begins it with a discussion of the weather as it conditioned the human group and summarizes by saying:* The year having proved southerly, wet and mild, in the winter the general health was good except that early in spring,\* at the same time as the cold snaps which occurred, were many malignant cases of erysipelas, some from a known exciting cause and some not. Many died, and many suffered pain in the throat. Voices were impaired, there were ardent fevers, phrenitis, aphthae in the mouth, tumors in the private parts, inflammations of the eyes, carbuncles, disordered bowels, loss of appetite, thirst in some cases though not in all, urine disordered, copious, bad, long coma alternating with sleeplessness, absence of crisis in many cases and obscure crises, dropsies, there were patients suffering from each of the above types, and fatal cases were many. The symptoms of each type were as follows:

Many were attacked by the erysipelas all over the body when the exciting cause was a trivial accident or a very small wound, especially when the patients were about sixty years old and the wound was in the head, however little the neglect might have been. Many even while undergoing treatment suffered from severe inflammations, and the erysipelas would quickly spread widely in all directions. The exudate which formed was not like pus, but was a different sort of putrefaction with a copious and varied secretion. Fever was sometimes present and sometimes absent. These symptoms were terrifying rather than dangerous. For whenever they resulted in suppuration or some similar reaction the cases usually recovered. But whenever the inflammation and the erysipelas disappeared without producing any abscessions, there were many deaths. The course of the disease was the same to whatever part of the body it spread. It was in the spring that by far the greater number of cases of erysipelas

\* In spring occur melancholia, madness, epilepsy, bloody flux, angina, colds, sore throats, coughs, skin eruptions and diseases, eruptions turning generally to ulcers, tumors and affections of the joints (APHORISMS, III, 20.)

*That eruptions turning generally to ulcers in the spring is valid, has been demonstrated day by day studies of the normal individual tested with the cantharides blister method (THE PATIENT AND THE WEATHER, Volume III, Subject I, page 177.)*

occurred but they continued also throughout the summer and during autumn

Much trouble was caused to some patients by the tumors in the throat, inflammations of the tongue and abscesses about the teeth <sup>25</sup> If a pregnant woman was attacked by erysipelas in the womb, it was fatal <sup>26</sup>

### THE CONSTITUTION OF THE SEASON AND OF THE BODY

If the year, having had a certain character to a marked degree, has given this character to the constitution, the diseases too have this character to a marked degree and are more severe So, after the first rains, when rain is coming after a long drought, it is possible to predict dropsies, and when the other slight signs appear at a period of calm, or at a change, one must infer what diseases are typical of the various rains or winds, and must listen to anyone who knows the nature of the spring or summer that will follow a winter of such and such a character

Rains occur every other day, or every day, and at other intervals, some are continuous Winds sometimes last for many days, and are opposed to one another, others are shorter, some, like rains, are periodic These have resemblances to the seasonal constitutions, though less marked The constitutions of men are well or ill adapted to the seasons, some to summer, some to winter, others again to districts, to periods of life, to modes of living, to the various constitutions of diseases Periods of life too are well or ill adapted to districts, seasons, modes of living and constitutions of diseases So with the seasons vary modes of living, foods and drinks In winter no work is done and foods are ripe and simple—an important point, in autumn work is done, exposure to the sun is beneficial, drinks are frequent and foods varied, with wine and fruits <sup>27</sup>

*The Greek physician who observed that certain disease phenomena were associated with seasonal periodicity, sought to bring this association into line with preponderance of certain humoural imbalances, so, for instance, with a severe winter, phlegm would be more powerful, at other times the spring might be accentuated (i e, warmth and moisture) and with this blood (i e, hyperemia) would domi-*

nate the physiological state, or yellow (tissue fluid) or black bile (liver bile, the after effect of too much blood!)

Today we would object to this particular catalog of unbalances, we would discuss such physiological states in terms of the endocrine balance, the relation of calcium to potassium, the pH levels or the lymphocyte-leucocyte ratio

These things Hippocrates could not know, but his basic observation was correct and he experimented as well as he could. He gave the same drug in the same dose to the same man at the four different seasons and then he found that he would vomit the most phlegmatic matter in the winter, the moistest in the spring, the most bilious in the summer and the blackest in the autumn.<sup>28</sup> He immediately drew the inference that if these things are so, such diseases as increase in the winter ought to cease in the summer and such as increase in the summer ought to cease in the winter with the exception of those that do not depart in a period of days. The period of days I shall speak of afterwards. When diseases arise in the spring, expect their departure in the autumn, such diseases as arise in the autumn must have their departure in spring. Whenever disease passes these limits you know they will last a year. The physician, too, must treat diseases with the conviction that each of them is powerful in the body according to the season which is most conformable to it.<sup>29</sup>

And now, one of the most important generalizations. To know the whole matter the physician must set himself against the established character of diseases, the constitutions, the seasons and the ages, he must relax what is tense and make tense what is relaxed.

FOR IN THIS WAY THE DISEASED PART WOULD REST MOST AND THIS, IN MY OPINION, CONSTITUTES TREATMENT.<sup>30</sup>



*In this final sentence there is encompassed most of the wisdom of the body when it has to deal with disturbed function!*

## CHAPTER II

# Anoxia

### Synopsis



We resemble the plants that are called *Stratiotae*. As these float freely in the water in which they root, drifting hither and yon, so are we, too, like plants rooted in the atmosphere, in motion with it, moving now here, now there

Hippocrates

*AIR AS THE PRIME NECESSITY FOR TISSUE FUNCTION—DISTURBANCE OF SUPPLY A MAJOR FACTOR IN DISEASE* Organ involvement and symptomatology may differ, the cause of disturbance may be uniform

*No fire without air* Fish breathe air dissolved in water Change in blood distribution with change in physiological states, peripheral depletion with chilling

*Headache Vasoconstriction and associated chemical changes (urine)*

*Brain and brain function* The circulation being irregular, all kinds of irregularities occur

*Disturbance of air supply modifies developmental trends of the embryo*

NOTES—*The Seat of Disease Migraine The Urine*

*When a recent medical advertisement carried the caption 'man, thoroughly accustomed to a terrestrial existence, has suddenly been put into the air' (i.e., that we must consider the atmosphere of importance in physiological reactions), it occurred to me that a beautiful simile, from an Egyptian papyrus (where credited to Hippocrates) might very appropriately preface this chapter,<sup>1</sup> for we moderns, who have advanced so far in a century can, with good grace, be humble in the presence of the great clinician whose prescience grasped 'the significance of air hunger' as a common factor in disease*



*Man has not 'suddenly been put into the air'! Our first amphibian-like progenitor achieved this distinction eons ago when, crawling from the ooze, the head was projected out into the atmosphere. And certainly for a million years or so our more or less hairy immediate ancestors have been very much interested in the air in which they had then being True, they were very close to the soil, but they were at all times in the air and whether it was hot or cold, dry or moist, calm or turbulent, was of importance for them.*

*About a hundred and fifty years ago we began balloon ascensions and later the French physiologists—but chiefly Bertr<sup>2</sup>—became very much interested in acute air hunger. But air hunger as a basic cause of disease, as a prime factor and as of particular significance in diverse symptomatic phenomena, was not considered until years later, when Pawlmo<sup>3</sup> published a short dissertation. It broadly presented the rôle of anoxia in inflammation, and this as the basic reaction in disease. Pawlmo<sup>3</sup>'s interest followed Ehrlich's study<sup>4</sup>.*

#### AIR HUNGER AND DISEASE

*Let us turn back the pages to Hippocrates and there to the world's first valid generalization concerning the cause of disease, an amazingly shrewd deduction based on observation of natural phenomena witnessed in the clinical picture and the course of disease.*

Now of these obscure matters one is the cause of diseases—what the beginning and source is, whence come affections of the body. For knowledge of the cause of disease will enable one to administer to the body what things are advantageous. Treatment of this sort is most natural. For example (*Hippocrates, the concrete thinker always turned to 'for example'*) hunger is a disease, as everything is called a disease which makes a man suffer. What then is the remedy for hunger? That which makes hunger to cease. This is eating. Medicine is, in fact, subtraction and addition, subtraction of what is in excess and addition of what is wanting. He who performs these acts best is the best physician, he who is farthest removed therefrom is also farthest removed from the art.<sup>5</sup>

Now of all diseases the fashion is the same but the seat varies [*Note A*]. So while diseases are thought to be entirely unlike one another, owing to the difference in their seat, in reality all have one essence and cause.<sup>6</sup>

NOTE WELL, seat of disease

Bodies of men and animals generally, are nourished by three kinds of nourishment and the names thereof are solid food, drink and wind. Wind in the body is called breath, outside it is called air. It is the most powerful of all and in all and it is worthwhile examining its power. When much air flows violently, trees are torn up by the roots through the force of the wind, the sea swells into waves, vessels of vast bulk are tossed about. Such then is the power that it has in these things but it is invisible to sight though visible to reason.\* What can take place without it? In what is it not present? Air is the cause of both winter and summer, being in winter thick† and cold, in summer gentle and calm. Air is food for fire and without air fire could not live. Wherefore, too, air being thin causes the life of the sun to be eternal.

The life of the sun to be eternal! *The Greeks had a perfectly rational concept of the rôle of the sun in our universe*

The sea, too, partakes of wind, for swimming creatures would not be able to live did they not partake of wind. Now how could they partake except by inhaling the air in the water?

*Even Aristotle did not draw that conclusion!*

There is nothing that is empty of air.<sup>7</sup>

For mortals, too, this is the cause of life, and the cause of disease in the sick. A man can be deprived of food or drink for two or three days and live, but if the wind passages of the body be cut off, he will die in the brief part of a day, showing that the greatest need of a body is air. Moreover all other activities are intermittent, for life is full of change, but breathing is continuous for all mortal creatures, inspiration and expiration being alternate.

Now I have said that all animals participate largely in the air. So after this I must say that it is likely that maladies occur from this source and from no other.<sup>8</sup>

*Hippocrates didn't know how the air, which reached all parts of the body, got there. He could not surmise the capillary bridge between arteries and veins. In SACRED DISEASE, air goes directly to the*

\* The simple demonstration the Greeks used was merely to blow up an animal skin and then sit on it!

† How could the Greeks know that cold air was thicker, i.e., heavier? We don't know, possibly they made the deduction when they observed the smoke rise with the warm air of the fire. The statement goes back to Anaximenes.

brain (apparently without the intervention of vessels?) Again, the an-filled passages press on veins and so interfere with the proper passage of blood. But important is the fact that in his physiological scheme, an had to get to all tissues if proper function was to be maintained, if there was interference, there was dis-ease in whatever tissue or organ that was an hungry

### STASIS ANOXIA AND HEADACHE

He accurately described the change in the distribution of the blood mass in chilling. Said he: The blood, through fear of the shivers that are present, runs together and dashes throughout the body to the warmest parts. As the blood leaps from the extremities of the body to the viscera, the sick man shakes. The reason is that some parts of the body become overfull, but others depleted, of blood. Now the depleted parts cannot be still but shake, because of their being chilled, for the heat has left them.

Headache with fever arises in the following manner. The blood passages in the head become narrowed. The veins in fact are filled with air, and when full and inflated cause the headache, for the hot blood forcibly forced through the narrow passages, cannot traverse them quickly because of the many hindrances and barriers in the way.<sup>9</sup>

*This is valid today: first an anoxia, then the liberation of histamine or histamine-like substances, followed by the accumulation of fluid about the smaller vessels and the associated tension on nerve fibers—then the headache [Note B]*

Hippocrates went a step further. He observed the biochemical change in the urine associated with headache.

When in fevers the urine is turbid like that of a beast of burden, in such a case there either is or will be a headache.<sup>10</sup>

*Beasts of burden, being herbivorous, have an alkaline urine and it is turbid. Carnivorous animals have a clear urine. In headache this biochemical change can be frequently followed in clear-cut fashion by the clinical observer [Note C]*

*The following is characteristically Hippocratic.* Now I hold that no constituent of the body in any way contributes more to intelligence than does blood. So long as the blood remains in its normal

condition, intelligence too remains normal, but when the blood alters, the intelligence also changes <sup>11</sup> *In SACRED DISEASE this thought is repeatedly expressed*

### THE CIRCULATORY BACKGROUND OF DYSFUNCTION AND DISEASE

*Finally I would clinch the Hippocratic recognition of the significance of both humoral and tissue change in disease with the following terse discussion* So in one place it (*i.e.*, the blood) stops, in another it passes sluggishly, and in another more quickly Progress of the blood through the body proving irregular, all kinds of irregularities occur <sup>12</sup>

*The pathologist, who is interested in the dysintegration of function and form as underlying clinical symptomatology, stresses just this concept*

So breaths are seen to be the most active agent during all diseases, all other things are but secondary and subordinate causes <sup>13</sup>

*The physician of today might not be willing to follow all of the way* He only gives oxygen as a last resort! Hippocrates thought in simple terms, in first principles As long as the tissue receives an adequate quantities, increased functional demand can be met, when an can no longer keep pace, disease occurs

*We promptly interject* How about infection? It still holds true because if tissue reactions are normal, infection rarely occurs Proper supply is basic and Hippocrates not only recognized that, but also that local inadequacy would be followed by local symptomatology

*This brings me to deny the assertion often made that the Greeks thought in general terms of disease, that only dyscrasias, i.e., disturbances of the humours, or that the active formation of noxious substances in the humours (which had to be eliminated) caused disease, that the "seat of disease" was not recognized* This is not true In such an accepted text as SACRED DISEASE Hippocrates brings evidence that convulsions occur because of disturbances of the brain and that the brain may show changes The truth of this is best shown by the cattle that are attacked by this disease, especially by the goats,

which are common victims. If you cut open the head you will find the brain moist, very full of dropsy and of an evil odor, whereby you may learn that it is not a god but the disease that injures the body. So it is also with a man.<sup>14</sup> *This is certainly clear recognition of the 'seat of disease'.*

*Long before the Dark Ages, and back of the Roman era, "distinguished for its diams rather than brains" as some scholarly wag has put it, the Great Physician not only dissected and examined but ordered the natural phenomena witnessed in disease, and clearly recognized anoxia as a major cause—recognized, too, the localization of disease. Disease was a natural phenomenon, not sent by gods or demons, not cured by spells or exhortation or prayer or other illiberal practices.*

*I do not know how Hippocrates could have known so much about medicine or so much about the weather or the planet on which he lived. Accumulated folk experience and tradition, possibly even written records, may have been available to a far greater extent than we now assume. The early wax and wooden tablets have all disappeared, only clay and stone and some papyrus survived.*

*Knowledge of weather and season must have been commonplace, its importance for the farmer and herdsman, for merchant and sailor was self-evident. For the Greek (and for Mediterranean civilization in general), travel meant travel by sea. Sailing required knowledge of wind and weather. Even Hippocrates made use of nautical similes, as when in ANCIENT MEDICINE, he says that. Most physicians seem to me to be in the same case as bad pilots, particularly the latter are unnoticed so long as they are steering in a calm, but, when a great storm overtakes them with a violent gale, all men realize clearly then that it is their ignorance and blundering which have lost the ship. So also when bad physicians, who comprise the great majority, treat men who are suffering from no serious complaint, so that the greatest blunders would not affect them seriously—such illnesses occur very often, being far more common than serious disease—they are not shown up in their true colors to laymen if their errors are confined to such cases, but when they meet with a severe, violent and dangerous illness, then it is that their errors and want of skill are manifest to all.*

The punishment to the impostor, whether sailor or doctor, is not postponed but follows speedily<sup>15</sup>

*We moderns seem far removed from the immediate forces of the environment, we are unmindful of cold and rain and snow and wind. We live in cities, our houses are considered weather-proof, our transport is well sheltered, our attention is focused on remote things*



*about which we read (or see) or hear, we are passive participants—seemingly*

*The Greeks were active participants in life the farmer, the tradesman, even the philosopher. Disturbances of the air in which they lived—wind or rain, snow or fog, storm or blistering heat—were obvious and caused discomfort. Sickness of body was discomfort. The unstable balance of the organic forces would, in his mind, readily correspond to the unstable balance of the atmosphere—the storm and its discomfort, to the storms in the humours of the body, and disease. What more logical than that Hippocrates should have proceeded to the conclusion that, with the organism so closely lined to the air supply, to weather and season, an disturbance was a basic cause of disease?*

*Most important was the intuition that the blood supply was in some fashion related to the proper air supply. Hippocrates had an excellent understanding of the anatomy of the circulation (heart, lungs and vessels\*) and he possessed a very proper appreciation of the function of the circulation and the pathophysiological signifi-*

cance of improper circulation, when in one place the blood stops, in another it passes sluggishly and in another more quickly<sup>1</sup>

*In that one sentence there is revealed the basic understanding of disease*

### EFFECT ON THE EMBRYO

*And now, in another sentence, there is again disclosed the sweep of Hippocratic vision—the keen grasp of the interrelation of cause and effect (the impact of inorganic forces on the organic world)—illustrated in a manner that is, I believe, unique in the literature of science*

Wherefore it is natural to realize that generation, too, varies in the coagulation of the seed and is not the same for the same seed in summer as in winter nor in rain as in drought<sup>16</sup>

*The genetic trend conditioned by the environment at the time of conception<sup>1</sup>*

*He knew of arteries ('taking root in the heart'), and veins By analogy he assumed a to and fro motion in the arteries, comparable to the to and fro motion of the air in the respiratory tract This was a rather logical concept for the time There are two recent studies that review the subject in a most satisfactory manner (Diepffen—HABEN DIE HIPPOKRATIKER DEN BLUTKREISLAUF GEKANNT Kl Wchr L937 16, 1820, and Hamburger—DEVELOPMENT OF KNOWLEDGE CONCERNING THE MEASUREMENT AND RHYTHM OF THE PULSE Jr Mt Sinia Hosp 1942, 8, 585 and CONTRASTING CONCEPTS OF THE HEART AND CIRCULATION IN ANCIENT AND MODERN TIMES Bull Hist of Med L943, 14, 148*



# Reproduction—

## *The Dancer Lost Her Baby*

### *Synopsis*



*'The dancer lost her baby'*

*DISTURBANCE OF EMBRYONIC DEVELOPMENT WITH ENVIRONMENTAL IMPACT* Modification of true hereditary transmission of habitus, character, sex, etc Day-by-day observation of the chicken embryo

*The problem of fertilization—male seed (fire and water) i.e., energy and matter—commingling with female seed (water and fire) Fertilization limited to one day each month*

*The importance of the an supply for development*

*The dancer lost her baby* Respiratory exchange, blood, and the uterine milieu (i.e., the soil) *The villous membrane—the umbilicus* *The cause of the expulsion of the foetus* *The bird embryo* *Nutrient from the egg yolk* *Respiration through the porous shell*

*The effect of weather in modifying the soil (uterus) in which the embryo grows*

*The anthropological implication* *The Phasians* *The Scythians* *The Europeans* *Habitus and character*

NOTES—*Cytoplasmic Modification of Genetic Trends* *The Phasians*

### *DISTURBANCE OF EMBRYONIC DEVELOPMENT*

*We have just read a startling thesis, projected on the background of anoxia as a basic factor in organic disturbance*

*Disturbance of the an mass (weather) governing this basic component in organic economy, Hippocrates' deduction was logical that disease must be associated with*



*weather disturbance He now extended this line of reasoning by suggesting the possibility that an organism would be most susceptible to such disturbance when metabolism would be at its height, in other words, (expressed in terms of heat) when the organism is hottest This he stated was on the first day of life \**

*In anthropological observations made in his travels about the Greek world, he saw that people differed The groups seemed more homogeneous and uniform in countries where weather and season were less disturbed, more highly differentiated in Greece and on the shores of the European mainland where weather and season were much more variable*

*It was a logical step for this keen observer and thinker to reach the conclusion that there arises more corruption in the coagulation of the seed (in other words, disturbance in the early development of the embryo) when the changes of the seasons are frequent than when they are similar or alike and the same reasoning applies also to character <sup>1</sup>*

*If the humours change with weather and season, if there was disturbance of the air supply at the critical time, it would seem logical that the normal development of the embryo might be disturbed (corrupted) by brusque environmental impacts On the other hand, in regions of environmental quiescence, where the seasons are alike, there takes place no corruption or deterioration in the coagulation of the seed except through the blow of some violent cause or of some disease <sup>2</sup> In such regions and among such people the genetic and truly hereditary transmission would proceed without alteration and consequently the variability to be observed in the human group would be less [Note A]*

*In Europe too there are tribes differing one from another in stature, in shape and in courage The differences are due to the same*

\* For you must know that a man is warmest on the first day of his existence and coldest on the last For it must be that the body is hot which grows and progresses with force, but when the body begins to decay with an easy decline it grows cooler It is on account of this that a man, growing most on his first day, is proportionally hotter than on his last day decaying most, he is proportionally cooler (NATURE OF MAN, Paragraph 12 )

causes I have mentioned above, which I will now describe more clearly. The inhabitants of a region which is mountainous, rugged, high, and watered, where the changes of the seasons exhibit sharp contrast, are likely to be of big physique, with a nature well adapted for endurance and courage, and such possess not a little wildness and ferocity.

As to those that dwell on thin, dry, and bare soil, where the changes of the seasons exhibit sharp contrast, it is likely that in such a country the people will be hard in physique and well braced, fair rather than dark, stubborn and independent in character and in temperament. For where the changes of the seasons are most frequent and most sharply contrasted there you will find the greatest diversity in physique, in character, and in constitution.

These are the most important factors that create differences in men's constitution, next comes the land in which a man is reared and the water. For in general you will find assimilated to the nature of the land both the physiques and the characteristics of the inhabitants. For where the land is rich, soft and well watered, and the water is very near the surface, so as to be hot in summer and cold in winter and if the situation be favorable as regards the seasons, there the inhabitants are fleshy, ill-articulated, moist, lazy, and generally cowardly in character, slackness and sleepiness can be observed in them and as far as the arts are concerned they are thick-witted and neither subtle nor sharp. But where the land is bare, waterless, rough, oppressed by the winter storms and burnt by the sun, there you will see men who are hard, lean, well articulated, well braced and hairy, such natures will be found energetic, vigilant, stubborn and independent in character and in temper, wild rather than tame, more than average sharpness and intelligence than the average, and in war of more than average courage. The things also that grow in the earth all assimilate themselves. Such are the most sharply contrasted natures and physiques.<sup>3</sup>

*Statements such as these, the reader may say, are but the fantastic notions of primitive men, ignorant of genetics. They may have been current among the wise women and the shepherds, where tradition survived that more rams would be conceived when ewes were bred at a time when*

*old Boreas was blowing! Even Aristotle kept such notions alive by discussing them \**

*The shepherds were right, and so was Hippocrates and so was Aristotle and so was the foolhardy professor of obstetrics and embryology<sup>4</sup> who was ousted from the University of Vienna because he had like notions in the Year of our Lord, 1890, in a community where phenomena such as maleness or femaleness were matters determined by God Which of course they are, depending on the definition of God*

### THE CHICKEN EMBRYO

*The story moves too fast, we turn back to genetics to see what the Hippocratic school thought about the origin of life*

*We shall be strictly scientific and confirm our human observations by careful study if we take twenty or more eggs and hatch them under two or more hens and after the second day carefully open one each day We can readily confirm all that I shall say about the development of the embryo, insofar as we may compare the development of the human with that of a bird, that the membranes extend from the umbilicus, and that we can also determine all the other observations that I have described for the human from the beginning of development to the end Of course, if one has not previously seen it one will be surprised to observe an umbilicus in the bird <sup>5</sup>*

*And now we shall start at the beginning on the basis that natural laws govern all things,<sup>6</sup> even the development of the egg*

Male seed (*semen*) passes into the uterus<sup>7</sup> and there commingles with the female seed (*egg*) While both semen and egg are necessary and both contain all the elements necessary for total development, the male seed is stronger because it initiates development <sup>8</sup> And both semen as well as the egg contain male and female potentials The same male may produce seed of different potentials and strength at different times and so, too, may the female, under the circum-

\* *It has fertilization occurs during the time of the south wind the offspring is more fit to pro e fer ile becuse of delay in the coagulation of the seed" Aristotle—PROBLEMATICA—quo ed' in GESUNDHEITSWESSEN BEI ARISTOTLE, Carl Kalthoff, Berlin, 1954, page 105*

stances it is not surprising that the same parents may at certain times produce male as well as female offspring

The seed commingling in the uterus, it condenses (coagulates) and is warmed (*fire*) \* Man is actually hottest on the first day of life (*i e*, *the metabolic rate is highest*) Respiration goes on because of the warmth and the maternal organism's breathing Originally supplied with air, and warmed, this warmed air (*exhausted air*) forces an outlet and when this is established, the embryo draws in cold air from the mother Thus respiratory exchange is established that goes on continuously during pregnancy

Of course other things that become warm must have air and this air finds a passage outward In turn cold (*fresh*) air passes inward for nutriment Such exchange is true of wood that burns

I am convinced that the seed (*i e*, *the embryo*) in the uterus contains air and releases it at the same time that it receives air from the mother, for when the mother inspires cold fresh air from the atmosphere, the embryo also receives some But the embryo is warm (*i e*, *the metabolism is high*) being in a warm place and thereby releases gas (*air*) When (*so developing*) blown up by the air the embryo develops a membrane, a coherent surface which envelopes it A passage is provided through this membrane for the air At this place the membranes are raised and here the tissue formation is least (*i e*, *the egg is most translucent*) The embryo develops in spherical fashion within this membrane<sup>9</sup>

\* Now if the fire (*sperm, contributing energy, in balance with matter*) fall in a dry place it is set in motion, if it also masters the water emitted with it and therefore it grows so that it is not quenched by the onrushing flood, but receives the advancing water (*female contribution*) and solidifies it on what is there already But if it fall into a moist place, immediately from the first it is quenched and dissolves into lesser rank (*i e*, *if the energy (sperm) is lost and it finds no ovum, it disappears*) On one day in each month it can solidify and master the advancing parts, and that only if it happens that these parts are emitted from both parents together in one place (REGIMEN I, 27)

*In modern terms we would say that if the healthy sperm can maintain its normal motility and can contact a normal ovum, fertilization can occur*

*Note that the statement is clear that only on one day each month it can solidify and master the advancing parts, i e, only on one day can fertilization take place Rock and his associates have determined that the ovum is susceptible to fertilization for only a few hours (Rock, J, Reboul, Jean, and Snodgrass, James M, Am Jr Obs & Gyn 1938, 36,*

## THE DANCER LOST HER BABY

I shall describe a human embryo of approximately five weeks which I have examined a lady of my acquaintance had a slave (a dancer and hetaera) who had frequent intercourse with men, pregnancy meant disgrace The girl had heard (it was common talk among the women) that if a woman became pregnant, the semen was retained and not discharged She carefully noted this, and when at one occasion she observed retention of the semen she called it to the attention of her mistress who, in turn, informed me



*'It is common talk among the women'*

I had her jump vigorously, slapping the heels against the buttocks, in this fashion she jumped seven times This was then followed by a discharge (*Abortion was common practice not only among the prostitutes but among women in general in Greece While it was contrary to the ethics of the profession to bring on an abortion, as here suggested, Hippocrates presumably permitted his scientific interest to override the ethical consideration*)

The seed (*embryo*) looked as though one had taken off the shell of a fresh egg and the moist interior shimmered through. It was red and round, there were white, rather thick threads (*villae*) in a thick red clot and there were bloody spots on the surface. In the middle of the membrane a very thin hillock appeared which looked like a navel, as though respiration and inspiration were here carried on. From this point the membranes extended over the whole embryo <sup>10</sup>

To continue the embryo is contained in a membrane, it breathes in and out and grows because of the supply of maternal blood that supplies the uterus. When a woman is pregnant menstruation ceases if the development is to be normal, though in a few women a regular flow may occur for the first period.

The blood is concentrated about the embryo and the external membranes. The while the blood and the air is attracted to the interior (*at the umbilicus*) at the region of penetration the embryo becomes firm and grows. In time many membranes form inside of the original envelope in a fashion similar to the first one. They arise in common with the navel and are interconnected. Later solid flesh is formed, but at the center of this, the navel, through which the embryo breathes and obtains its nutriment, is prominent <sup>11</sup>

It is probable that menstruation ceases because, instead of the humoural disturbance associated with the sudden loss of blood, the blood is used continuously by the uterus for the growing embryo. The blood flows regularly instead of monthly, as it is attracted to the growing embryo, as this develops the capacity to take up the nutriment. So, too, with respiration, at first both the respiration and the blood flow are not so great but when respiration increases the embryo attracts the blood in greater quantity and more then flows to the uterus <sup>12</sup>

As soon as the tissues have formed, the membranes increase and cavities are formed, particularly at the periphery. The blood from the maternal organism is attracted by the breathing tissues of the growing embryo. That which is not used is secreted into the interstices of the placenta. This portion is called the villous membrane <sup>13</sup>

The growing organism is organized by the warm air. Like goes to like, all material goes to its predestined related tissue, from which too it has originated <sup>14</sup>

Nourishment and growth of the embryo are related to the supply of material provided by the mother through the uterus, and as the mother is either healthy or sick, so the child will be either healthy or sick, just as plants that grow in the soil and are nourished by the earth. The condition of the earth conditions the development of the plant from the seed<sup>15</sup>

*Hippocrates then draws far-reaching analogies between generation in the human and in animals and plants. As plant seeds grow with warmth (i.e., fire) and need the air and the fluids and solids contained in the earth, so, too, in humans, generation and growth of the seed rest on fire (warmth and energy), air, water and earth—all integrated, a common mingling and a common respiration, the whole as well as the part, in harmoniously integrated functional coordination.*

*Individual origins, whether in plant or animal are derived from sources common in the vastness of the universe, proceed to the ultimate differentiation, again to descend from that complex differentiation to the undifferentiated vastness of the universe. Being and not being are one<sup>16</sup>*

*In the final chapter of this short treatise Hippocrates then examines the reason why this parasitic embryo finally seeks freedom, why it is expelled from the uterus.*

### THE EXPULSION OF THE FOETUS

*His theme is as simple as it is basically correct, namely that the child is expelled when it can no longer receive adequate nourishment. The balance is then disturbed and something happens—again we go back to the idea of equilibration—and so he presents the following analogy from his observations on the egg.*

To supplement the contention that the child is expelled because of lack of nourishment, not because of some unusual force, consider the following: the bird embryo obtains its nourishment from the yolk of the egg in the following fashion. The warmth of the sitting mother heats the egg and so development is initiated by the mother (i.e., energy). Once commenced, there is warmed air in the egg and this in turn draws in cold (i.e., fresh) air from the atmosphere through the shell (respiratory exchange is established), for the shell is sufficiently porous to permit the passage of adequate quantities of

fresh air. The bird embryo grows and differentiates, just as does the child, though it draws largely from the yolk, but also from the egg white for nutriment.

All who have observed the process carefully, are well aware of this: when the embryo has exhausted the supply from which it is nourished, strong movements begin within the shell, the embryo seeks more nourishment and the membranes are detached. As soon as the mother observes that the young bird is making strong movements, it pecks at the shell\* and peels out the young. This takes place at about twenty days. It is well known that this is so, for when the bird has picked at the shell there is practically no more fluid in the egg, because it has been used up in the development of the embryo.

Just so it is with the human. When the embryo has matured, the maternal organism can no longer adequately supply nutriment, then movement becomes violent. In its search for more nutrition than is available, the child moves and it seeks freedom. This seldom is later than the tenth month.

In a similar manner, both in domesticated and wild animals, a time is fixed for gestation, for in every species a time must come when the nutritive balance is lessened and exhausted—then birth takes place.<sup>17</sup>

#### INDIVIDUAL AND GROUP DIFFERENTIATION—THE RESULT OF ENVIRONMENTAL IMPACTS ON THE DEVELOPING EMBRYO

*Now we return to the statement that generation, too, varies with the coagulation of the seed, and is not the same for the same seed in summer as in winter nor in rain as in drought, and, in so doing, we shall follow the Hippocratic line of reasoning that led him to this seemingly bizarre theory—that is, bizarre in the mind of the orthodox geneticist.*

*He has presented his thesis that*

*(A) all disease is due to a disturbed organic balance,*

*(B) that the most important factor for normal function is an adequate blood and an supply,*

*Here Hippocrates was apparently mistaken.*



(C) that the condition of the organism is wholly governed by the environment, and by the major cosmic forces of the environment—sun, earth, air, and water, by time and place. Of these

(D) the change in the air mass (weather) is immediately effective

(E) the condition of the uterus reflects the general condition of the maternal organism—it is the soil in which the young embryo grows, this provides nutriment (i.e., the gases, the fluids, the solids) just as plant seed is provided with similar contributions by the earth and the sun, of these the gaseous exchange, the breathing of the young embryo (whether indirect



respiratory exchange through the medium of the maternal circulation, or atmospheric exchange through the shell of the egg), was given first consideration,

(F) this conditioning of the uterine soil conditioned the development of the embryo,

(G) since the maternal organism was susceptible to wind and weather and season, what more logical than to assume that wind and weather would influence the development of the seed? That it would condition the offspring, so that it would modify the hereditary trends (which, of course, Hippocrates accepted), and induce differences in habitus, sex, mental qualities and in character? And

(H) finally, the obvious deduction, that when the environment was more variable there would be greater differences in the individuals of the group living in such variable environmental situations

At the very beginning of organic differentiation, the individual is conditioned by this force! A power that is ever active but never in all time ever quite the same, and yet the same!

*Inescapable destiny—unpredictable predetermination for each individual organism—predictable determination for the mass!*

*Unpredictable predetermination for each individual sun, predictable determination for the myriad masses of suns!*

*Unpredictable predetermination for each individual election—predictable determination for the myriads!*

*That was the Hippocratic concept* In a word, all things are arranged in the body in a fashion conformable to itself, by fire (*energy*), a copy of the whole (*cosmos*), the small after the manner of the great and the great after the manner of the small <sup>18</sup>

The hottest and strongest fire, which controls all things, ordering all things according to nature, IMPERCEPTIBLE TO SIGHT OR TOUCH, wherein are soul, mind, thought, growth, motion, decrease, mutation, sleep, waking—this governs all things always, both here and there and is never at rest But men do not understand how to observe the invisible through the visible!

For all things are alike, though unlike, all compatible, though incompatible, conversing, though not conversing, intelligent without intelligence The fashion of each is contrary, though in agreement <sup>19</sup>

*Hippocrates, the biologist, derived knowledge of the invisible through the visible, as pathologist and physician, from the dead, knowledge of the living* <sup>20</sup>

## THE ANTHROPOLOGICAL IMPLICATION

Now we will compare Asia (*Asia Minor*) and Europe (*i.e., the Mediterranean and Black Sea Littoral*) and show how they differ in every respect, and how the nations of the one differ entirely in physique from those of the other Asia Minor differs very widely from Europe in the nature of all its inhabitants and of all its vegetation For everything in Asia Minor grows to far greater beauty and size, the one region is less wild than the other, the character of the inhabitants is milder and more gentle The cause of this is the temperate climate, because it lies toward the east, midway between the risings of the sun, and farther away than is Europe from the cold Growth and freedom from wildness are most fostered when nothing is forcibly predominant, but equality in every respect prevails Asia, however, is not everywhere uniform, the region, however, situated

midway between the heat and the cold is very fruitful, very wooded and very mild, it has splendid water, whether from rain or from



The men will be well nourished, of very fine physique and very tall

springs While it is not burnt up with the heat nor dried up by drought and want of water, it is not oppressed with cold, nor yet damp and wet with excessive rains and snow Here the harvests are likely to be plentiful, both those from seed and those which the earth bestows from her own accord, the fruit of which men use, turning wild to cultivated and transplanting them to a suitable soil The cattle, too, reared there are likely to flourish, and especially to bring forth the sturdiest young and rear them to be very fine creatures The men will be well nourished, of very fine physique and very tall,\* differing from one another but little either in physique or stature This region, both in character and in the mildness of its seasons, might fairly be said to bear a close resemblance to spring Courage, endurance, industry and high spirit could not arise in such conditions either among the natives or among immigrants, but

pleasure must be supreme <sup>21</sup>

### THE PHASIANS

*Now let me turn* to the dwellers on the Phasis [Note B] Their land is marshy, hot, wet and wooded, copious violent rains fall there during every season The inhabitants live in the marshes, and their dwellings are of wood and reeds, built in the water They make little use of walking in the city and the harbour, but sail up and down in dug-outs made from a single log, for canals are numerous The waters which they drink are hot and stagnant, putrified by the sun and swollen by the rains The Phasis itself is the most stagnant and most sluggish of all rivers The fruits that grow in this country are all

\* Most interesting modern confirmation of the Hippocratic observations is that of Orren Lloyd Jones (*American Journal of the Diseases of Children* 60 11, 1940—CALIFORNIA TALL CHILDREN)

stunted, flabby and imperfect, owing to the excess of water, and for this reason they do not ripen. Much fog from the waters envelops the land. For these causes, therefore, the physique of the Phasians is different from that of other folk. They are tall in stature, and of a gross habit of body, while neither joint nor vein is visible. Their complexion is yellowish, as though they suffered from jaundice. Of all men they have the deepest voice, because the air they breathe is not clear, but moist and turbid. They are by nature disinclined for physical fatigue. There are but slight changes of the seasons, either in respect of heat or of cold. The winds are mostly moist, except one breeze peculiar to the country, called cenchron,\* which sometimes blows strong, violent, and hot. The north wind rarely blows, and when it does it is weak and gentle.<sup>22</sup>

With regard to the lack of spirit and of courage among the inhabitants, the chief reason why Asiatics are less warlike and more gentle in character than Europeans is the uniformity of the seasons, which show no violent changes either towards heat or towards cold, but are equable. For there occur no mental shocks nor violent physical changes, which are more likely to steel the temper and impart to it a fierce passion than is a monotonous sameness. For it is changes of all things that rouse the temper of man and prevent its stagnation.<sup>23</sup>

### THE SCYTHIANS

And in Europe is a Scythian race, dwelling round Lake Maeotis, which differs from the other races. Their name is Sauromatae. Their women, so long as they are virgins, ride, shoot, throw the javelin while mounted, and fight with their enemies. They do not lay aside their virginity until they have killed three of their enemies, and they do not marry before they have performed the traditional sacred rites. A woman who takes to herself a husband no longer rides, unless she is compelled to do so by a general expedition. They have no right breast, for while they are yet babies their mothers make red-hot a bronze instrument constructed for this very purpose and apply it to the right breast and cauterize it, so that its growth is arrested, and all its strength and bulk are diverted to the right shoulder and right arm.<sup>24</sup>

\* *A fall wind from the Caucasus Mountains?*

As to the physique of the other Scythians, in that they are like one another and not at all like others, the same remark applies to them as to the Egyptians, only the latter are distressed by the heat, the former by the cold. What is called the Scythian desert is level grassland, without trees, and fairly well-watered. For there are large rivers which drain the water from the plains. There too live the Scythians who are called Nomads because they have no houses but live in wagons. The smallest have four wheels, others six wheels. They are covered over with felt and are constructed like houses, sometimes



*Scythians Bandaging*

in two compartments and sometimes in three, which are proof against rain, snow and wind. The wagons are drawn by two or by three yoke of hornless oxen. They have no horns because of the cold. Now in these wagons live the women, while the men ride alone on horseback, followed by the sheep they have, their cattle and their horses. They remain in the same place just as long as there is sufficient fodder for their animals, when it gives out they migrate. They themselves eat boiled meats and drink mares' milk. They have a sweetmeat called hippace, which is a cheese from the milk of mares (hippoi) <sup>25</sup>

So much for their mode of living and their customs. As to their seasons and their physique, the Scythians are very different from all other men, and, like the Egyptians, are homogeneous, they are the reverse of prolific, and Scythia breeds the smallest and the fewest

wild animals For it lies right close to the north and the Rhipaeian mountains, from which blows the north wind The sun comes nearest to them only at the end of its course, when it reaches the summer solstice, and then it warms them but slightly and for a short time The winds blowing from hot regions do not reach them, save rarely, and with little force, but from the north there are constantly blowing winds that are chilled by snow, ice, and many waters, which, never leaving the mountains, render them uninhabitable A thick fog envelops by day the plains upon which they live, so that winter is perennial, while summer, which is but feeble, lasts only a few days For the plains are high and bare, and are not encircled with mountains, though they slope from the north The wild animals too that are found there are not large, but such as can find shelter under ground They are stunted owing to the severe climate and the bareness of the land, where there is neither warmth nor shelter And the changes of the seasons are neither great nor violent, the seasons being uniform and altering but little Wherefore the men also are like one another in physique, since summer and winter they always use similar food and the same clothing, breathing a moist, thick atmosphere, drinking water from ice and snow, and abstaining from fatigue For neither bodily nor mental endurance is possible where the changes are not violent For these causes their physiques are gross, fleshy, showing no joints, moist and flabby, and the lower bowels are as moist as bowels can be For the belly cannot possibly dry up in a land like this, with such a nature and such a climate, but because of their fat and the smoothness of flesh their physiques are similar, men's to men's and women's to women's For as the seasons are alike there takes place no corruption or deterioration in the coagulation of the seed, except through the blow of some violent cause or of some disease <sup>26</sup>

### THE EUROPEANS

Such is the condition of the Scythians The other people of Europe differ from one another both in stature and in shape, because of the changes of the seasons, which are violent and frequent, while there are severe heat waves, severe winters, copious rains and then long droughts, and winds, causing many changes of various kinds Wherefore it is natural to realize that generation too varies in the coagula-

tion of the seed, and is not the same for the same seed in summer as in winter nor in rain as in drought It is for this reason, I think, that the physique of Europeans varies more than that of Asiatics, and that their stature differs very widely in each city For there arise more corruptions in the coagulation of the seed when the changes of the seasons are frequent than when they are similar or alike The same



reasoning applies also to character In such a climate arise wildness, unsociability and spirit For the frequent shocks to the mind impart wildness, destroying tameness and gentleness For this reason, I think, Europeans are also more courageous than Asiatics For uniformity engenders slackness, while variation fosters endurance in both body and soul, rest and slackness are food for cowardice, endurance and exertion for bravery Wherefore Europeans are more warlike <sup>27</sup>

These are the most important factors that create differences in men's constitutions, next come the land in which a man is reared, and the water For in general you will find assimilated to the nature of the land both the physique and the characteristics of the inhabitants <sup>28</sup>

## CHAPTER IV

# Epilepsy and Hydrophobia



Asklepios  
(Temple Charm  
Cos )

## *Epilepsy*

### *Synopsis*

*LENNOX AND COBB'S TRIBUTE* Freedom from superstition Heredity Vascularization Convulsions with change in the organic state The effect of change in environmental temperature, season, weather The function of the brain The opposite states of hydration and dehydration The central origin of epilepsy Changes in vascularization of the brain "Air" gives the brain its intelligence

## *Hydrophobia*

### *Synopsis*

*THE SERIOUSNESS OF HYDROPHOBIA* Universal among men and animals Transmitted by the bite of the sick animal Tissues contaminated Analogies of contagion The symptoms The divergent types of the disease (with hydration and dehydration of the brain) The problem of epidemic fevers The storm in the body

NOTES—Heredity Physiological Effects of Heat and Cold Multiplicity of Conditioning Factors Shock Therapy

### EPILEPSY

We shall illustrate the Hippocratic thesis of the dominant rôle of weather in conditioning the patient, by examining his discussion of a clinical syndrome, namely the epileptic convulsion

Only a few years ago Lennox and Cobb<sup>1</sup> concluded their monograph on EPILEPSY as follows

"The greatest recent advance in our knowledge of epilepsy is the



*demonstration that changes in the physical and chemical processes of the body and presumably, therefore, in the brain, may profoundly modify seizures,*

*"So fast have we traveled that we have at last caught up with the Father of Medicine! Hippocrates, or one of his school, wrote a treatise on epilepsy, in which he endeavored to take the symptom out of the realm of the supernatural and explain it on a physiological basis. At the close of his argument he makes this striking statement 'but whoever is acquainted with such a change in man and can render a man humid and dry, hot and cold by regimen could also cure this disease—without minding purifications, spells, and all other illiberal practices of a like kind' "*<sup>2</sup>

*"Only in the last year or two has the truth of Hippocrates' underlying thought been demonstrated. Paralleling his concept but paraphrasing his words, we may say that 'whoever is acquainted with physiology and can render a man acidotic, dehydrated and fully oxygenated could also repress this disease without minding purification of narcissistic personalities, ritualistic empirical diets, and all other illiberal practices of a like kind' "*

*In the opinion of Hippocrates, the so-called "sacred disease" is no more divine or more sacred than other diseases, but has a natural cause. Without equivocation he boldly proclaims his thesis and unfurls his banner:*

*Its supposed divine origin is due to men's inexperience and to their wonder at its particular character. But if considered divine just because it is wonderful, there will be not one but many diseases, for other diseases are no less wonderful and portentous, but nobody considers them sacred "*<sup>3</sup>

*It has the same nature as other diseases and the same cause that gives rise to other diseases "*<sup>4</sup>

### THE CAUSE

*Heredity is of utmost importance, as well as the constitutional type, for the disease takes origin in the embryo if the metabolic balance is disturbed \* [Note A]*

\* Hippocrates did not use these words. He wrote: Its birth begins in the embryo while it is still in the womb, for like other parts the brain, too, is purged and has its impurities expelled before birth (i.e., metabolism goes on during development and the

*Hippocrates entered into a discussion of the blood supply to the brain, anatomically incorrect, it is true, but of significance in stressing the fact that by these veins we take in the greater part of our breath, and they spread it over the body through minor veins and then breathe it out again (through the lungs) for the breath cannot rest, but moves up and down<sup>5</sup> The immediate implication follows in that if caught anywhere (i.e., the air in the veins) and rests, that part of the body where it rests becomes paralyzed<sup>6</sup> There was always the underlying thought that if air did not get to the tissues, dysfunction promptly arose*

*The idea was current at the time that phlegm\* was discharged from the brain and this, when thick, would in some fashion interfere with the flow of blood in the veins, once warmed and dispersed in the veins, circulation would be unimpeded When, therefore, phlegm cannot escape from the brain and obstructs the cerebral vessels, the patient becomes speechless and chokes, froth flows from the mouth,*

*products of metabolism must be eliminated) In this purging, if the action be thorough and regulated, and if there flow away neither more nor less than is proper, the infant has a perfectly healthy head (i.e., if the metabolic balance has been normally maintained the head will be healthy) But if the flux from all the brain be too abundant, and a great deliquescence occurs he will have, as he grows, a diseased head and one full of noise and he will not be able to endure either sun or cold (i.e., if there occurs some profound metabolic disturbance during the growth of the cerebral tissues, the head will be unduly sensitive to environmental changes)*

*~ PHLEGM was the term used for colorless fluids (synovial, cerebrospinal, lymph and tissue—inflammatory swelling—as well as secretions from the mucous surfaces) It was assumed that such phlegm was secreted from the cerebral and other tissues and absorbed by the blood vessels Accumulating in the vessels, it might cause "blockade", as here suggested, interfering with the blood supply to the brain tissues*

*A similar mechanism was suggested in paralysis The loss of control over the body occurs for the following reasons when the vessels contain mucus so that they are no longer as active as they were before and are cooled, for if the blood is no longer in proper activity, the body also becomes immovable and stiff<sup>8</sup>*

*The phlegm might be dispersed to various parts of the body through the blood vessels; it might pass from the vessels to the nasal passages and then be excreted, it might pass along the pharynx and bronchi to the lungs and, if "corrupted," cause pulmonary disease*

*The undue accumulation of such fluid, which by comparison to blood seems cold, characterized certain individuals (phlegmatic), or seasons (winter), being used in a symbolic sense Today we make use of presumptive endocrine preponderance or organ preponderance, etc to identify certain constitutional forms*

he gnashes his teeth and twists his hands, the eyes roll and intelligence fails him and in some cases excrement is discharged<sup>7</sup>

*Thus the acute attack was caused by some sudden change in the general condition of the body\** when the blood flow in the veins was interfered with, intercepting the air, not admitting it to the brain, checking respiration

*The primary cause of disturbance of the brain (the flux, i.e., disturbance of normal metabolic balance)* in children occurs mostly when the head has been heated by sun or fire and then suddenly the brain has been chilled (*with the wind in the north*)

In other cases the cause is (*on the contrary*) that the south wind, suddenly coming on after north wind loosens and relaxes the brain (hydration) after it is braced and strong (dehydrated) so that the phlegm overflows. It is also caused by fear (*i.e., emotion*) or if while weeping the child is unable quickly to recover his breath (*hyper-ventilation*), things which often happen in children. Whichever of them occur, the body is immediately chilled, the patient loses the power of speech, the breath stops, the brain hardens and the blood stays

The blood stays<sup>1</sup>

Of old patients the greatest enemy is winter. For when an old man has been heated in the head and brain by a large fire, and then comes into the cold and is chilled, or if he leaves the cold for warmth and a large fire [*Note B*], he experiences the same symptoms and has a seizure, according to what has been said already. There is a serious risk of the same thing happening in the spring also if the head be struck by the sun. In the summer the risk is least, as there are no sudden changes<sup>10</sup>

When the disease dates from infancy, the habit has been formed of

*Change in the general condition of the body (i.e., in the chemistry of the body) was revealed to the Hippocratic physician by change in the urine.* If a patient with epilepsy suddenly passes thin and unconcocted urine contrary to habit (and without having taken large quantities of fluid previously), it indicates that an attack will occur, particularly if such patients then have cramps in the shoulder or in the neck or in the back, or if portions of the body go to sleep or if such patients have disturbed dreams

The feeling of cold in the neck and in the back which run over the body of the patient indicates cramps. These are associated with fine precipitate in the urine.<sup>9</sup> *The reader will recall a like observation related to migraine Notes, Chapter II*

the flux occurring at the changes of the winds, and the patient generally has an attack then, especially if the wind be in the south <sup>11</sup>

### THE AURA

Such as are habituated to their disease have a presentment when an attack is imminent, and run away from men, home, if their house be near, if not, to the most deserted spot, where the fewest people will see the fall and immediately hide their heads <sup>12</sup>

### THE POWER OF THE ATMOSPHERE

At the changes of the winds, for these reasons do I hold that patients are attacked, most often when the south wind blows, then the north wind, and then the others. In fact the north and the south are stronger than any other winds, and the most opposite, not only in direction but in power. For the north wind contracts the air and separates from it what is turbid and damp, making it clear and transparent. It acts in the same way upon everything as well that arises from the sea or waters generally. For it separates the moist and the dull from everything, including men themselves, for which reason it is the most healthy of the winds. But the action of the south wind is the opposite. At first it begins to melt and diffuse the condensed air, inasmuch as it does not blow strong immediately, but is calm at first, because it cannot at once master the air, that before was thick and condensed, but requires time to dissolve it. In exactly the same way it acts upon earth, sea, rivers, springs, wells and everything that grows in which there is moisture, and moisture is in everything, though more in some things than in others. All these things feel the effects of this wind, and become dull instead of bright, hot instead of cold, wet instead of dry. Vessels of pottery too kept in rooms or underground, which are full of wine or other liquid, always feel the effects of the south wind and change their shape to a different form. The sun, moon and stars it makes much duller than they normally are. Since then it so masters even things that are so big and strong, makes the body feel its effects and change with the changes of these winds, of necessity a south wind relaxes and moistens the brain and enlarges the veins, while north winds press together the healthiest part of the brain, separating the most diseased and moist

and washing it out, for which reason the fluxes occur at the changes of these winds. Thus this disease is born and grows from the things that come to the body and leave it, it is no more troublesome to understand and cure it than are others and is no more divine than others are <sup>13</sup> [*Note C*]

### THE BRAIN

Men ought to know that from the brain, and from the brain only, arise our pleasures, joys, laughter and jests, as well as our sorrows, pains, griefs and tears. Through it, in particular, we think, see, hear and distinguish the ugly from the beautiful, the bad from the good, the pleasant from the unpleasant, in some cases using custom as a test, in others perceiving them from their utility. It is the same thing which makes us mad or delirious, inspires us with dread and fear, whether by night or by day, brings sleeplessness, inopportune mistakes, aimless anxieties and absentmindedness and acts that are contrary to habit. These things that we suffer all come from the brain, when it is not healthy, but becomes abnormally hot, cold, moist, or dry, or suffers any other unnatural affection to which it is not accustomed.

Madness comes from its moistness. When the brain is abnormally moist, of necessity it moves, and when it moves neither sight nor hearing are still, but we see or hear now one thing and now another, and the tongue speaks in accordance with the things seen or heard on any occasion. But all the time that the brain is still a man is intelligent <sup>14</sup>

In these ways I hold that the brain is the most powerful organ of the human body, for when it is healthy it is an interpreter to us of the phenomena caused by the air, as it is the air that gives it intelligence. Eyes, ears, tongue, hands and feet act in accordance with the discernment of the brain, in fact, the whole body participates in intelligence in proportion to its participation in air. To consciousness the brain is the messenger. For when a man draws breath into himself, the air first reaches the brain, and is so dispersed through the rest of the body, though it leaves in the brain its quintessence, and all that it has of intelligence and sense. If it reached the body first and the brain afterwards it would leave discernment in the flesh and

the veins, and reach the brain hot,\* and not pure but mixed with the humour from flesh and blood, so as to have lost its perfect nature <sup>15</sup>

Wherefore I assert that the brain is the interpreter of consciousness. The diaphragm<sup>16</sup> has a name due merely to chance and custom, not to reality and nature, and I do not know what power the diaphragm has for thought and intelligence. It can only be said that, if a man be unexpectedly overjoyed or grieved, the diaphragm jumps and causes him to start. This is due, however, to its being thin and having a wider expanse than any other organ. Since it perceives nothing before the other parts do, but is idly named as though it were the cause of perception, just like the parts by the heart called "ears," though they contribute nothing to hearing. Some people say that the heart is the organ with which we think, and that it feels pain and anxiety. But it is not so, it is merely convulsed, as is the diaphragm. Neither, however, has any share of intelligence, but it is the brain that is the cause of all the things that I have mentioned. As therefore it is the first of the bodily organs to perceive the intelligence coming from the air, so, too, if any violent change has occurred in the air owing to the seasons, the brain also becomes different from what it was.

Therefore I assert that the diseases too that attack it are the most acute, most serious, most fatal, and hardest for the inexperienced to judge of <sup>17</sup>

This disease, styled sacred, comes from the same causes as others, from the things that come to and go from the body, from cold, sun, and from the changing restlessness of winds. These things are divine. So that there is no need to put the disease in a special class and to consider it more divine than the others, they are all divine and all human. Each has a nature and power of its own, none is hopeless and incapable of treatment. Most are cured by the same things as caused them. One thing is food for one thing, and another for

\* Here, as in GENERATION, the clear distinction is made between air that is 'hot,' i.e., laden with CO<sub>2</sub>, and therefore seeking escape, and air that is 'cold,' or fresh and that has been supplied directly from the lungs. In view of the beautiful observations of Bronck and others, indicating the steep gradient between the oxygen tension in the capillaries and the actual cellular layer of the cortex and with this, the significance of even small differences in the available oxygen in these vessels, the Hippocratic discussion, is, I believe, almost uncanny.

another, though occasionally it does it harm. So the physician must know how, by distinguishing the seasons for individual things, he may assign to one thing nutriment and growth, to another diminution and harm. For in this disease as in all others it is necessary, not to increase the illness, but to wear it down by applying to each what is hostile to it, not that to which it is accustomed. For what is customary gives vigor and increase, what is hostile causes weakness and decay. Whoever knows how to cause in men by regimen moist or dry, hot or cold—he can cure this disease also, if he distinguish the seasons for useful treatment, without having recourse to purifications and magic<sup>18</sup> [Note D]

*In the consideration of this chapter it is important to keep in mind the simple concept that is uppermost in Hippocratic thought. The opposite winds, cold and hot (polar and tropical air masses), initiate physiological reactions, and alter the state of the body. The cold front is more brusque, the warm front insidious in its advance. But the human subject is most susceptible if conditioned by heat (warmth of fire or sunshine) before the onset of cold, or by cold before the effect of heat. It is contrast that is important, the amplitude of the adjustment that has to be made. North and south winds are opposite in power, i.e., in the effectiveness in changing the fluid constituents of the body. Why shouldn't they be? posed Hippocrates, in view of the fact that these air masses are diametrically opposite in their effects on inanimate objects (i.e., hydration or dehydration, in differences of visibility, etc.). Generally the clear, bright air after the storm (the passage of a polar air mass) was healthier than the south wind. As a matter of fact the very name Asklepios carried the suggestion of "clear bright air after a storm," as the health-giving god<sup>19</sup>*

*But more than that, the state of the brain in the non-epileptic (the epileptic being considered as more susceptible than the normal) was subject to similar changes from moist to dry and dry to moist and when the brain was too moist or too dry, or was changed in any other fashion beyond its normal limits, the brain responded abnormally (insanity)*

#### BLOOD—AIR—FUNCTION

So if all the blood experiences a thorough disturbance, the intelligence is thoroughly destroyed<sup>20</sup>

*The organ was the seat of disease (he had demonstrated this by observations in animals)<sup>18</sup> but function might remain within normal range, unless the organism was too violently disturbed by weather, by emotion, by trauma, etc. Then, with altered circulation, the function would become abnormal. Restore the normal circulation and the humoral balance, and then the brain (or any other organ) returns to its normal function.*

*It is the air that gives it intelligence<sup>19</sup> And since it is the most important organ and needs much air, it first perceives changes in the air and thus becomes different from what it was. The brain and the body are air conditioned—weather conditioned! And these changing conditions the physician must recognize and treat accordingly by regimen, by drugs, by suggestion.\**

*The ideas developed by Hippocrates in his discussion of epilepsy find expression over and over again in the texts. He clearly defines (a) the pathophysiologic effects of environmental change per se, (b) the significance of the diametrically opposite effects of the polar and tropical air masses, (c) the summation that occurs with the transitions of the equinox, when summer-man must adjust to winter-man, or winter-man to summer. This, in particular, involves major biological adaptation and, when exaggerated by acute episodes such as characterize equinoctial storms, is more apt to precipitate disease. Another consequence (d), namely the fatigue associated with summation effects, finds recognition in the statement that by studying and observing after this fashion one may foresee most of the consequences of the changes. One should be especially on one's guard against the*

*One sentence in the treatise on epilepsy permits a short digression. Hippocrates, writing for the group of properly trained and accepted physicians of the guild of Asclepios, attacked the charlatans and their illiberal practices—the soothsayers, magicians, purifiers and quacks who treated their epileptic patients by a variety of hocus-pocus, diets, incantations, amulets, and what not. But some of them must have been smart at that, for we read that one of the methods involved 'having nothing to eat or drink.' Both dehydration and acidosis are at times useful and apparently Hippocrates missed a bet in the ardor of his wrath. It is amusing because we did something of the same sort about a quarter of a century ago. An osteopath in New York had taken up a treatment of this type (possibly having come down through the centuries in folk tradition) whereby a relatively acidotic state was maintained (by starvation ketosis) and some patients were improved. The medical profession then took it up from this "illiberal practitioner!"<sup>21</sup>*



most violent changes of the seasons, and unless compelled one should neither purge, nor apply cautery or knife to the bowels before at least ten days are passed. The following are the four most violent changes and the most dangerous both solstices, especially the summer solstice, both the equinoxes so reckoned, especially the autumnal <sup>22</sup>

*Of course he mentioned the arthritic weather prophet* "as it is possible to infer diseases from the season, so occasionally it is possible from diseases to forecast rain, wind, and drought, for example, north winds and south winds. For he who has noted symptoms carefully and accurately has evidence upon which to work, certain skin diseases, for instance, and pains at the joints are irritating when the rain sets in, to quote one example out of many <sup>23</sup>

*All this was sound pathophysiology, but the while these observations were recorded and the interrelations recognized, Hippocrates went a step farther. He recognized that there must be an additional something which did not depend on the purely physical properties of the an mass. He recognized contagion! He described it in another disease of the central nervous system and the discussion warrants inclusion at this point*

## HYDROPHOBIA

Medical authors have by no means always been right, indeed they have often glossed over some very important facts in their dissertations

Were we certain that, because of human limitations, we could never expect to solve some of these problems, it might be well to let well enough alone, but when we deal with well established facts that are obvious even to laymen, it seems hardly proper to ignore them by silence <sup>24</sup>

So I propose to write about one of these most commonly observed mental disorders, namely hydrophobia, because it endangers all mankind, and all animals at all ages. If one does not know the early symptoms of the disease, the nature, and the causes that underlie it, we will not be able to treat it properly <sup>25</sup>

It is a most serious and widely disseminated disease that can be conveyed to all animals and is most common in Egypt and India, and particularly among the natives of other hot and dry countries

The common people are naturally apt to regard it as of divine

origin because, if it spreads from one to the other without apparent cause, it is but natural that they should regard it as epidemic, or divine

Very likely it is not divine, because sacrifices are of no avail! No, the gods are not to blame in such conditions

Nor is the disease due to faulty regimen, for the victims have led diverse lives and carried on every kind of activity, but they become afflicted with one and the same kind of disease just the same

### A CONTAGION FROM BITES

It is universally distributed because the disease is conveyed through bites, whether in Libya or in Ionia, in the islands or on the mainland, but we can regard it as epidemic since apparently there is no obvious cause for the onset of the disease, whether in India or in Egypt <sup>26</sup>

First concerning the general causes this probably has to do with a change in the air (due to unusual dryness) and for that reason the disease does not appear spontaneously in all species of animals but only among certain of them such as the lion, the wolf, the dog, hyena, ibis, basilisk, and other very dry animals (i.e., with tight flesh) Their bite then transmits the disease like a plague to others

### THE BRAIN IS CONTAMINATED

We can define the disease as an epidemic disease of the brain that takes its origin from the infected blood (blood with poison)

If the air has been filled with a miasma that injures the brain of certain of the animals that I have mentioned, they become ill When, however, a non-infected animal is bitten by an infected one, the disease passes from the stronger to the weaker If the bite occurs in the soft subcutaneous tissues, the tissue fluids become contaminated, if in a vein or artery, the blood, and so blood and air and tissue fluids (humours) are involved

It passes to the brain and the brain is injured If present in large amounts, the response may be prompt, if small in amount, the effect may be delayed and in part appear externally <sup>27</sup>

Obviously the brain has derived something from the body Let us see by analogy how this is possible Just as a bit of moist wool placed in contact with some dry wool will transmit the moisture to the second until it is completely saturated, so, too, we must consider the poison from the teeth of the animal—first the effected tissue, then the

surrounding tissue, and finally the brain is involved

Or let us take another example. If we throw a small glowing coal into a small pile of wool, the whole does not immediately burn up. Only a little ignites, but this glow then spreads until the whole is consumed.

In a like manner body is overwhelmed by the disease.

We see this, too, in the following: when the body as a whole has been contaminated by the blood stream (i.e., either because of universally distributed poison from the air, or from a bite), the psychic functions of the brain are rapidly altered. The patient has exciting visions and hallucinations. Similar effects too can be observed in animals.

The patient talks irrationally, the face is flushed, the eyes are red, he becomes violent. Because of the hallucinations, he is frightened and thinks he is being bitten, becomes convulsed and unconscious, the memory is lost and he is quite irrational.

The brain, its physical state altered (dry, because of the interference with the air supply, heat, and the effect of toxin), can no longer be at rest and in this state, the receptors of the eye and ear are active and the patient talks irrationally of things he experiences in fantasy. Occasionally he commits irresponsible acts, is restless and fearful of water.

If, on the other hand, the brain is altered in the opposite direction (i.e., toward moisture) the patient is apt to be quiet, silent, is not hypomanic although he is mentally disturbed, he becomes morose and depressed and melancholy.

When the brain is quiet, the patient is rational. It becomes quiet again when the blood distribution is once more normal.<sup>28</sup>

When the voice is tremulous, dry, eunuchoid or hoarse, the eyes sunken, the tongue dry and stiff or necrotic, or if patches appear under the tongue, and the vessels of the tongue are dilated and pulsate, or the tongue is covered with vesicles, the ears are roughened and the tendons of the hands are tense and the head shrunk and the nose pointed and fleshless, when the hair falls out and the feet are restless, the patient violent and vicious, irrational, noisy or convulsed—all these are signs of hydrophobia.

If now the patient is fearful of water it is a fatal sign, and so, too, if he is fearful of drawing in air.

When the disease has reached the brain from a bite or more general cause the patient endures all the symptoms that I have enumerated, if he has labored respiration it is portentous, if he is fearful of water it is fatal <sup>29</sup>

### DISEASE AS A STORM IN THE BODY

*Greek physicians had much malaria to contend with—Hippocrates differentiated quotidian, tertian, quartan and continued forms, these fevers offered a problem in etiology that he tried to meet in the following fashion*

I will begin in the first place with the most common reaction, fever, for this is associated with all other diseases To proceed on these lines—there are two kinds of fever one is epidemic, called pestilence, the other is sporadic, attacking those who follow in that regimen Both of these fevers however are caused by air Now epidemic fever has this characteristic because all men inhale the same wind, and when a similar wind has mingled with all bodies in a similar way the fevers too prove similar But perhaps someone will say, "Why then do such diseases attack, not all animals but only one species of them?" I would reply that it is because one body differs from another, one air from another, one nature from another, and one nutriment from another For all species of animals do not find the same things either well or ill adapted to them, but some things are beneficial to some things and other things to others and the same is true of things harmful So whenever the air has been infected with such pollutions as are hostile to the human race then men fall sick, but when the air has become ill adapted to some other species of animals then these fall sick <sup>31</sup>

*Over and over Hippocrates comes back to the major effectiveness of the air mass on the human Winds cause differences (and this, too, is important) in all other respects, for humours vary in strength according to the season and to the district <sup>32</sup> The body fluids are changed by the winds and with the season, summer producing bile, spring blood! How could Hippocrates know that with spring our hematopoietic system is stimulated?*

It is changes that are chiefly responsible for diseases, especially the greatest changes, the violent alterations both in the season and in other things *Note immediately that generalization follows, for*

*Hippocrates says that seasons that come on gradually are the safest, as are gradual changes in regimen and temperature, and gradual changes from one period of life to another*<sup>33</sup>

For a man is in the best possible condition when there is complete coction (*i e., dispersion, diffusion*) and rest, with no particular power displayed (*i e., complete equilibration*)<sup>34</sup>

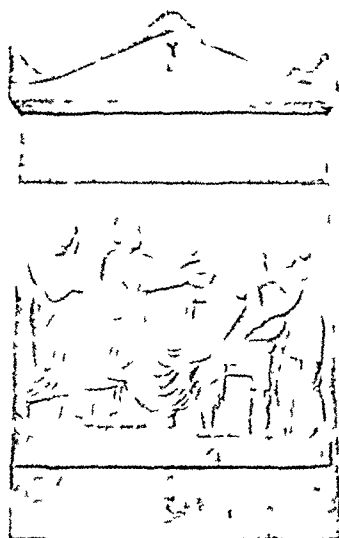
*It is just the analogy between the epileptic attack that Hippocrates uses to associate the storm of the an and the storm of the body that is disease Says he* When then will the victims of this disease rid themselves of their disorder and the storm that attends it? When the body, exercised by its exertions, has warmed the blood, and the blood thoroughly warmed has warmed the breaths, and these, thoroughly warmed are dispersed, breaking up the congestion of the blood, some going out along with the respiration, others with the phlegm The disease finally ends when the foam has frothed itself away, the blood has re-established itself and calm has arisen in the body<sup>35</sup>

*Today we would say that the epileptic attack is usually self-limited, because (as in asthmatic attacks) the accumulation of carbon dioxide and other capillary active substances ultimately reverses the spasm of smooth musculature and changes the state of the central and peripheral nervous mechanisms of control, so that proper vascularization can be re-established Hippocrates had the basic idea*



*Mourning*

# The Medical Clinic—I



*The Death of the Patient*

## *Pneumonia—Pleurisy— Empyema*

### *Synopsis*

THE HIPPOCRATIC PRACTICE Epidemiology Case records Pneumonia Diagnosis The excretions Prognosis Pleurisy and empyema Friction and succussion sound Rhonchi Treatment Edema and Hydrothorax Auscultation Differentiation from phthisis

NOTES—*Locus Minoris Resistantiae* Female Resistance Abdominal Diagnoses The Crisis in Pneumonia Intercurrent Disease Physical Diagnosis

The Hippocratic physician had to deal with the same diseases that we do, with upper respiratory infections and acute pulmonary diseases, with consumption, with diphtheria, measles, mumps, scarlet fever, typhoid and malaria, typhus and meningitis, gastrointestinal diseases, ulcer and colitis, biliary diseases, appendicitis and peritonitis, migraine and the whole gamut of autonomic dysfunctions, the nervous and mental diseases. In the many case records we find descriptions of everything from avitaminosis to endocrine dysfunction, from asthma to poliomyelitis, from anemias to hydrophobia, from amenorrhea to masculinization.

Sometimes the diagnosis was clear-cut and treatment equally certain and presumably efficacious. Sometimes the diagnosis was doubtful, the treatment expectant—the physician remembering two things to help or at least to do no harm<sup>11</sup>

*In the late winter and spring and again in the autumn practice was heavy* We read that the epidemic of coughs began about the time of the winter solstice, about fifteen or twenty days after the great and frequent changes in weather from warm to cold, from cold to warm. The illnesses lasted for shorter or longer periods of time, with occasional cases of pneumonia. Before the equinox most patients had relapses, usually about the fortieth day after the first attack.

Most often this relapse was short, with prompt recovery. Some had severe sore throats, others angina and pharyngitis, children especially showed day blindness. Relapses of pneumonia were rather uncommon.

The inflammations of the throat disappeared in a short time, particularly those who had day blindness. \* It happened more often in those people who used their voices greatly or had had a cold, these not infrequently were very apt to have anginas. Artisans, on the other hand, frequently had paralyses of the hand, riders and travelers and porters who used their legs unduly, had swellings of the leg and paralyses of the thighs and calves. Many were prostrated and fatigued [Note A]

Most of these complications occurred with the relapses, not with the first attack. Of those who lost their voices with their cough, most had no fever, some only a very short fever, but none of them had a pneumonia nor a paralysis in any other part—the entire disturbance was limited to the larynx.

Women were not much affected by the cough, few of them had fever and of these very few developed pneumonia (these occurred only in the older women) and they all recovered. We can explain this on the basis that the women, by comparison to the men, remained



*Travellers (and porters) who used their legs unduly*

\* 'Day Blindness' is repeatedly referred to in the texts. The symptoms and the therapy would indicate a riboflavin deficiency (Spies—SCIENCE, 1943, 98, 369)

A remedy against day blindness. The juice of the cucumber then after a time raw or liver dipped in honey, in a piece as large as can be swallowed—repeated. From VISION, Chapter VII (Kapferer and Stricker, Part 19)

at home, and then too, they are not so liable to be affected (i e, their resistance being greater than that of the men) [Note B]

Two noblewomen were afflicted with angina but it was relatively mild, on the other hand, the slaves, when they were sick with angina, had severe attacks and died rapidly. Among the men there were many cases of angina, a few recovered but many died.

All these illnesses continued throughout the summer and other diseases were then added.<sup>2</sup>

*We take another year* The equinox had passed. Winter was heralded with north winds, then shortly there were south winds for fifteen days, followed by two weeks of snowfall. At this time many patients became jaundiced, although there were no real crises, many relapses occurred in disease.

After the snow, there were south winds and rain. Coryza with fever now followed. Many patients had alveolar abscesses, sometimes in the center of the mandible, sometimes to the right side, sometimes extending to the orbit.

Many were hoarse, had sore throats and particularly the tonsils were inflamed, about the ear and the mandible there were soft swellings, sometimes with fever. The fever often occurred at the onset of the marked swelling, most often the swelling was bilateral (*mumps*).

Tonsillitis occurred in the autumn as well as in the winter, at the same time pityriasis-like skin eruptions occurred. Many women had miscarriages of various types and deliveries were difficult. Among all that were ill at this time, the crisis in fever was delayed to the sixth or the eighth day. The while these conditions appeared in many persons in the population, all kinds of other symptom complexes appeared. There were patients with diarrhea in whom hemorrhage occurred about the teeth. Here the prognosis was bad.<sup>3</sup>

*Then there was that interesting case, the infant son of Timonex,*



*The infant son of  
Timonex*



who at two months developed severe bleeding There were bright red swellings in the skin, as these faded there were muscle cramps and convulsions There was no fever but the symptoms were repeated for a whole series of days and the infant finally died <sup>4</sup>

*There were smart-alecks, as for instance,* the man who lifted the donkey on a wager and developed a fever almost immediately On the third day he had epistaxis, again on the fourth, fifth, seventh and eighth days and later he had a severe diarrhea <sup>5</sup>

*Then* the daughter of Pausanias, who had the misfortune to eat raw mushrooms, she became nauseated, had pain in the belly and was dyspneic and smothering She was given warm honey, after which she vomited and was placed in a warm bath In the bath she vomited the meal of mushrooms and as she improved she perspired freely <sup>6</sup>



*In Omeiadas a man  
became ill*

In Omeiadas a man became ill On an empty stomach he had severe borborygmus and complained of pain in the belly, if he then ate and had digested the food he was comfortable, after some time he again had the same severe pains He lost weight, became emaciated despite the fact that he ate well He had some difficulty in passing stool and the stool seemed as if it had been burned (black) Again, after he had eaten he was at least relieved of the borborygmus and the pain He was given all sorts of purgatives and

emetics, but nothing helped <sup>7</sup>

*There was the maid Hippocrates examined who had recently been purchased as a slave* She had a large, hard tumor on the right side that was not very painful, the belly was large and distended, but not as though in dropsy She was relatively fat, but not particularly short of breath nor pale

She had not menstruated for seven years This girl developed a diarrhea without tenesmus During this time there was tension on the right side which became more painful She had some fever but this did not last more than seven days She then developed amber colored diarrhea, copious and somewhat mucoid in character which lasted for several days After this she began to menstruate, the belly became soft, the complexion improved and she increased in weight <sup>8</sup>

*But while these abdominal conditions [Note C] presented difficulties in diagnosis, the diseases of the chest afforded a better opportunity for study*

*There being many upper respiratory infections because of the varying climatic strain, there was much pneumonia and pleurisy and the Greek physician was well versed in the diagnosis of these conditions*



*She had a large hard tumor on the right side*

## PNEUMONIA

With serious pain in both sides of the chest (*clavicles*) we deal with a pneumonia, which has resulted from a discharge from the head to the lungs through the small bronchi The lungs, being loose and dry, take up these fluids, become swollen, and if the whole lobe is involved, the lobe fills out the entire space and touches both pleural surfaces If only one side touches the pleura then one side has a localized pleuritis

The pneumonia is the more dangerous The pains are usually more severe, there is pain in the throat and the patient is markedly weakened and by the sixth or seventh day has considerable dyspnea If he does not make a recovery by crisis the patient may die or develop an empyema <sup>9</sup>

Pneumonia has the following characteristics marked fever, the

respiration hot and increased, anxiety and weakness is pronounced, the patient tosses about in pain, particularly in the shoulders and clavicles and at the nipples, with a feeling of oppression in the chest and some clouding of the sensorium. Sometimes no pain is felt until the patient begins to cough, but this type is usually more protracted and severe. The sputum is at first white and frothy, the tongue first yellowish and then darker, if dark at the very beginning the course is apt to be shorter.

The cough, which usually lasts from fourteen to twenty-one days, is severe, with copious and frothy sputum, about the seventh or eighth day, with the febrile crest, resolution may begin (when the inflammation has become moist), the sputum then is thicker than on the ninth and tenth day, then it is apt to become yellowish and bloody, from the twelfth to the fourteenth, copious and purulent.

In general in patients of humid constitution the disease is more serious, in those of a dry constitution the course is milder.<sup>10</sup>

If the sputum of pneumonic patients has a yellowish tinge, recovery follows shortly. If it is very yellow then the course is short, if it remains as it was in the beginning, resolution is not completed properly, nevertheless, a crisis can occur in these cases, as for instance, that which I witnessed in a patient who was sick in the house of the schoolmaster, and in other cases as well.<sup>11</sup> [*Note D*]

In cases where there is pain only in one clavicle only the upper lung lobe is affected. If in both clavicles, then both lobes are apt to be involved. If central, then usually the middle lobe is involved. If the bronchi are seriously inflamed so that they press toward the ribs, the motion of the ribs is apt to cease on that side and blue striae may appear in the region. If they do not proceed so far the patient may simply have pain.<sup>12</sup>

On the whole, patients who have dry exudative pneumonia and bring up little concocted sputum do not do so well.<sup>13</sup> In older individuals the lungs are looser and emphysematous, and the bronchi are dilated. Symptoms are more pronounced in young than in old people, in the first place because in the young the tissues are firmer and denser and so distention causes more pain. In the second place, because older individuals react more slowly and less vigorously. In

young people the smaller blood vessels are tense and well filled with blood. While they may recover from such illnesses, older people may have the processes go on and on and they die either from the original disease or from some intercurrent disease. This intercurrent disease (*a pneumonia*) accentuates any additional symptomatology and damage caused by the primary disease.<sup>14</sup> [Note E]

*For example, take liver involvement.* There was the wife of the blind Maiandrios who became ill at the time of the setting of the Pleiades with cough and an expectoration which was almost immediately yellowish-green and which ultimately became purulent. On the sixth day liver disturbance was evident and very little bowel movement. The sputum was first purulent and somewhat consolidated, with large, white, flat particles. She took no nourishment and died on the twentieth day.<sup>15</sup>

Eurydamos in Oineiradai, who was sick with pneumonia, became irrational after the tenth day. Under treatment he improved, the sputum became clear and apparently he was recovering. Then he became somnolent and his eyes jaundiced. He died after twenty days.<sup>16</sup>



Eurydamos in  
Oineiradai



There was the wife of  
the blind Maiandrios

## THE EXCRETIONS

*One can obtain considerable information concerning the general trends by examining the urine.* Patients who at the beginning of a pneumonia have a thick concentrated urine which before the fourth day becomes very thin, are apt to die. If at the very beginning the urine is not uniform but sometimes thick and sometimes thin, it indicates severe crisis and uncertain outcome. While a urine which had a normal precipitate before, and then clears up, also indicates a change in the clinical condition. The urine that changes its character frequently during fevers, indi-

cates longer duration and correspondingly fluctuating course of the disease <sup>16a,b,c</sup> Every urine that shows a black precipitate and is black is bad <sup>17</sup>

In all cases of pneumonia or pleural inflammation the sputum should be carefully examined Every sputum which is expectorated without pain is useful, it should be uniformly yellowish If, on the other hand, expectoration is delayed, or unconcocted and associated with severe cough—in those cases the course is prolonged, as it is, too, with very white, mucous, tenacious or coiled secretion, or greenish or foamy or bluish-green or violet-colored sputum More serious is the unmixed black expectoration If yellowish sputum containing little blood starts at the beginning, the prognosis is pretty good, after a week it is difficult to make a prognosis from the character of the sputum A very bloody or bluish-grey expectoration at the beginning is not a good sign <sup>18</sup>

*Naturally patients ill from these acute diseases require careful attention Hippocrates suggests that one of your pupils be left in charge to carry out instructions without unpleasantness, and to administer the treatment Choose out those who have already been admitted into the mysteries of the art, so as to add anything necessary, and to give treatment with safety He is there also to prevent those things escaping notice that happen in the intervals between visits Never put a layman in charge of anything, otherwise if a mischance occurs the blame will fall on you* <sup>18a</sup>

### NURSING IS IMPORTANT

The room in which the sick person lies should not be too sunny, shaded, comfortable and not exposed to the winds Preferably it should be darkened, not in the upper floor, so that there be less vibration, there should not be too many visitors who go in and talk, there should be little walking around The patient too should remain quiet and not talk He should not twist around and should not get up, apart from the toilet, he should not expose the body to chill, and thereby increase the fever Clothing and covers should be soft and clean Bathing can be omitted entirely The body should be anointed with pleasant unguents The extremities warmed and anointed and kept

under the covers. If you do not do that then the whole body becomes stiff and cold, the warmth which now goes from the lower extremities to the upper makes the fever worse (*i e*, *faulty distribution of the blood*)

Do not do anything that causes violent exertion, too much of anything is always harmful, but give large quantities of cooling drinks. Among the signs that one can watch are the character and distention of the arteries and the veins. Bowel movements can be provided by giving proper diet, suppositories or mild enemas. At all times proper respiratory activity and ventilation should be favored.<sup>18b</sup>

### THE PROGNOSIS

The prognosis depends on the origin of the pneumonia. Patients who have an angina which ultimately spreads to the lung usually die within a week. Some, however, recover and develop lung abscesses unless they develop a mucopurulent exudate.<sup>19</sup>

Patients who develop lung abscesses are very apt to have a continued fever which is not so pronounced during the day but increases at night. They expectorate very little, sweat about the neck and about the clavicle, the eyes become hollow, the cheeks red, the hands burn—particularly the finger tips, the knees become rough and the nails become curved. The patients become chilled and the feet are apt to swell, phlyctenae may occur about the body—all these are signs of long-continued purulent foci. We are apt to suspect abscess at the very beginning from the following signs, (1) with early dyspnea, (2) when rupture occurs on the twentieth to the fortieth day, and (3) in patients who early show dyspnea and respiratory difficulty, cough and salivation, these cases of rupture may occur about the twentieth day. To determine the day of onset, the physician should carefully inquire concerning the first day of heaviness or fever or chill.<sup>20</sup>

In lung abscess one may have occasional pain in the belly (*referred pain*) and in the sternal region, with rattling respiration and nausea and the expectoration of large quantities of pus.<sup>21</sup>

*There may be remote abscessions, which, after a severe pneumonia*

*localize in the region of the calves, these are usually not harmful. Repeatedly, such abscessions are associated with increased fever and inhibition of secretion. In that case there is danger that the patient may die.* In all cases of pneumonia where the proper expectoration does not take place on the proper day but who may show mental disturbances—such patients are apt to develop abscessions in the lungs <sup>22</sup>

### PLEURISY AND EMPYEMA

*Instead of pneumonia we may be dealing with a pleurisy.* Patients who have pleurisy and at the beginning of the third or fourth day begin to have an exudative expectoration, the course is usually shortened. If this expectoration is delayed then the crisis occurs later <sup>23</sup>

With pleural adhesions the patient has dyspnea and cough, sometimes with a white expectoration, pain in the chest and neck, the lung is adherent and he has the feeling as though there were a heavy weight in the chest. Sometimes the pain is very severe. HE HAS A FRICTION RUB LIKE LEATHER [Note F] and he is likely to hold his breath. He feels better when he lies on the involved side but not on the well side <sup>24</sup> Patients in whom one side of the chest is distended and warmer and who turns to the opposite side when lying on the bed and then have the feeling that a weight has been suspended in them—these have a unilateral empyema of the chest <sup>25</sup>

SUCH PATIENTS WITH EMPYEMA, WHEN SHAKEN, RESPOND WITH A LOUD SPLASH. These have less pus than those with less noise. The latter have greater dyspnea and the face is more flushed. Those who have no pain but are profoundly dyspneic and the nails blue [Note G]—these are full of pus and in danger of death <sup>26</sup>

Patients who have pleurisy and develop empyema (or abscesses) may cough up pus for forty days or even longer after the rupture of the abscess from the pleura <sup>27</sup>

The prognosis in pleurisy and all other pulmonary diseases is good if the patient reacts well, is free from pain, if the expectoration is freely brought up, if there is free respiration and not too great thirst and the whole body is uniformly warm and soft and if in addition to that, sleep and perspiration and urine and the gastrointestinal activity are normal <sup>28</sup>

In general, individuals who have a firm and hardened body are more liable to have difficulty with pleurisy than those who are not so conditioned <sup>29</sup>

Pleurisy without expectoration is apt to be serious, particularly if pains develop apically <sup>30</sup> If patients at the onset have bluish discoloration of the tongue (which looks like the blister that is formed when one plunges hot iron in oil), the disease is protracted and a crisis does not take place until about the fourteenth day Such patients frequently expectorate blood, <sup>31</sup> and patients who have deep blood-red urine have a poor prognosis <sup>32</sup>

All patients with pleurisy who have marked rhonchi in the chest when expectorating, and in whom the face becomes pinched and the eyes jaundiced and lusterless, these are apt to die <sup>33</sup>

In general, older patients with empyema (*after pneumonia*) are apt to die, on the other hand young people are more apt to die from other abscesses

If the sputum from patients with lung abscess who are doing poorly, continues to have a foul odor there is usually a fatal relapse which finally kills them and if the discharge following pleural drainage (in patients with empyema who have been operated upon) has a foul odor [*Note H*], the outcome is usually fatal

In those cases in which the iron probe becomes discolored as if it were in the fire, they also almost invariably die <sup>34</sup> [*Note I*]

If in pleurisy there is a yellowish bloody expectoration, resolution usually occurs on the ninth to the eleventh day and such patients usually recover If they have mild symptoms at the beginning, which then increase to the fifth and sixth day, they may reach the twelfth day without final determination of the outcome The seventh and the twelfth day are the most dangerous If they have passed the two seven-day periods they are safe <sup>35</sup>

As far as the pain is concerned in pleurisy it is beneficial if the belly remains soft, the expectoration becomes colored, if no rales appear in the chest, and if the urinary secretion is good On the other hand, sweetening of the expectoration is not a good sign for it has been observed that patients who begin to have empyema or lung abscess the sputum is at first salty and then turns sweet <sup>36</sup> [*Note J*]

Pleurisy is best treated as follows in general do not try to alter



the fever during the first seven days One gives an acid-honey mixture, or vinegar and water in large amounts so that the tissues, particularly of the lung, are well flushed and expectoration is accentuated The pain is well controlled by local heat, thin soups accentuate expectoration, the patient can be bathed on the fourth or fifth or sixth day, anointing then with oil On the seventh day a bath promotes sweating On the fifth and sixth day one can give expectorants <sup>37</sup>

In addition to empyema which may develop as the result of a pleurisy or a pneumonia, patients who have had trauma of the chest with a wound that is externally healthy but not healthy on the inside, are in danger of developing empyema, when the scar remains weak (inside) it is apt to recur <sup>38</sup>



*The case of  
Poseidonios*

*The old and presumably healed cases of empyema may be reactivated and the case of Poseidonios was of this nature He became ill at summer, had subcostal pain and pain in the ribs for a long time without fever Many years ago he had had empyema In the winter he got a cold, the pain increased, and there was a mild fever and expectoration of a purulent material with an irritating cough from the larynx He died in complete consciousness <sup>39</sup>*

## EDEMA OF THE LUNG AND HYDROTHORAX

In addition to these inflammatory conditions, fluids accumulate in the lungs for other reasons, as for instance with hydrothorax With this there is usually fever and cough, increased respiratory rate, the feet are apt to swell, the nails are distorted, many of the characteristics of those that we have had with empyema patients are to be observed only in milder degree and lasting over a longer period of time When one places the ear for a period of time over the pleura and listens one HEARS A BOILING SOUND LIKE FERMENTING VINEGAR [Note K] The condition lasts for a considerable period of time and then there may be rupture to the pleural cavity The patient seems immediately improved and well but after a period the chest cavity may again fill and the condition is worse than it was before In some cases one has swelling of the entire body, scrotum, the

face—and under these conditions some physicians may think they are dealing with an abdominal disease. These swellings, however, are only apt to occur if one misses the proper time for incision (of the pleura)

One must treat these cases if there is evidence of pointing by incision between the ribs. If, however, there is no localization then one has to give the patient a copious warm water bath, leave him sit as one does an empyema patient and incise at a point WHERE THE NOISE IS MOST pronounced, cutting however as far down as possible so that one can have proper drainage. After having made the drainage one puts on a bandage of linen, well padded and fluffed, permitting drainage to proceed as slowly as possible.<sup>40</sup>

In general patients who have pneumonia following pleurisy are in better condition than those who have pneumonia followed by pleurisy.<sup>41</sup>

*The Hippocratic physician did differentiate between the pleuritic pains of phthisis and the characteristic pleurisy that might occur with pneumonic lesions or trauma, but inasmuch as there could be no etiologic identification of the kind of pneumonia or pleurisy with which he might be dealing, there was a degree of uncertainty, only with continued observation of the case, with attention to all clinical phenomena was the final differential diagnosis fairly certain, as becomes evident in the following patients who have pain in the ribs with continued anorexia and pain in the heart, with sweat and a ruddy complexion and some diarrhea—these usually have ulcerations of the lungs, WHICH IS A DIFFERENT MATTER<sup>142</sup>*



# In the Medical Clinic—II

## *Phthisis*

### *Synopsis*



"The maiden  
daughter of  
Euryanix"

*THE CASE RECORD* Hard and unripened tubercles in the lungs The general mortality The effect of season Activation

*The clinical types* Treatment Complications Cavities Intestinal extension Bones The spine—treatment of dislocations and curvature

*Pott's disease*

*The physician baffled by the "unknown" cause*

*NOTES—Fistula, Laryngitis, the Mental State, Season, and Intestinal Extension Therapy Habitus Female Mortality Pulmonary Hemorrhage Tubercles in the Lung The Testicle*

### THE CLINICAL DESCRIPTION

These usually have ulcerations of the lungs, which is a different matter! as we shall now see

The maiden daughter of Euryanix was seized with fever Throughout the illness she suffered no thirst and had no inclination for food Slight alvine discharges, urine thin, scanty, and not of a good colour At the beginning of the fever suffered pain in the seat [Note A] On the sixth day did not sweat, being without fever, a crisis [Note B] The sore near the seat suppurated slightly, and burst at the crisis After the crisis, on the seventh day, she had a rigor, grew slightly hot, sweated Afterwards the extremities always cold About the tenth day, after the sweating that occurred, she grew delirious, but was soon rational again They said that the trouble was due to eating

grapes After an intermission, on the twelfth day she again wandered a great deal, the bowels were disturbed, with bilious, uncompounded, scanty, thin, irritating stools, which frequently made her get up She died the seventh day from the second attack of delirium This patient at the beginning of the illness had pain in the throat, which was red throughout [Note C] The uvula was drawn back Many fluxes, scanty and acrid She had a cough with signs of coction, but brought up nothing No appetite for any food the whole time, nor did she desire anything No thirst, and she drank nothing worth mentioning She was silent, and did not converse at all Depression, the patient despairing of herself [Note D] There was also some inherited tendency to consumption<sup>1</sup>

There was also some inherited tendency to consumption<sup>1</sup>

*Fever and cough, an ulcerated larynx, intestinal extension, a rectal abscess, anorexia, chills and sweating, and depression, then intermittent delirium—we hardly need the last sentence that binds together the clinical picture into a coherent whole<sup>2</sup>*

*With such clear recognition of a clinical entity it is small wonder that Hippocrates could generalize*

The physical characteristics of the consumptives were—skin smooth, whitish, lentil-colored, reddish, bright eyes, a leucophlegmatic condition, shoulder-blades projecting like wings [Note E] Women too so As to those with a melancholic or a rather sanguine complexion, they were attacked by ardent fevers, phrenitis and dysenteric troubles Tenesmus affected young, phlegmatic people, the chronic diarrhea and acrid, greasy stools affected persons of a bilious temperament<sup>3</sup>

*It was a common disease in Greece*

The severest and most troublesome disease, as well as the most fatal, was the consumption Many cases began in the winter, and of these several took to their bed, though some went about ailing without doing so Early in the spring [Note F] most of those who had gone to bed died, while none of the others lost their cough, though it became easier in the summer During autumn all took to bed and many died Most of these were ill for a long time Now most of these began suddenly to grow worse, showing the following symptoms frequent shivering, often continuous and acute fever, unseasonable,

copious, cold sweats throughout, great chill with difficult recovery of heat, bowels variously constipated, then quickly relaxing, and violently relaxing in all cases near the end, the humours about the lungs spread downwards, abundance of unfavourable urine, malignant wasting. The coughs throughout were frequent, bringing up copious, concocted and liquid sputa, but without much pain, but even if there was pain, in all cases the purging from the lungs took place very mildly. The throat did not smart very much, nor did salt humours cause any distress at all <sup>4</sup>

*He noted that when diarrhea occurred in the consumptive (i.e., intestinal extension) the disease was fatal [Note G] and it was potent when the hair fell out (i.e. when the nutrition of the hair follicle, supplied by a single end artery, was interfered with, when terminal spasm supervened). The two symptoms (diarrhea and loss of hair) often occurred simultaneously, a correct observation, by the way*

Consumptive patients whose hair falls off from the head are attacked by diarrhea and die <sup>5</sup>

*And now for the significance of season*

## ACTIVATION

In all the cases described spring\* was the worst enemy, and caused the most deaths, summer was the most favorable season, in which fewest died. In autumn and during the season of the Pleiades, on the other hand, there were again deaths, usually on the fourth day. And it seems to me natural that the coming on of summer should have been helpful. For the coming on of winter resolves the diseases

\* In those who have pain in the chest or ribs or other parts of the body one must carefully inquire whether these pains are associated with any particular season, if there are periods when the pain is better or worse, and if worse, whether the pains occur without any undue activity or exertion on the part of the patient himself.

The autumn is bad for the consumptive and so, too, the spring, when the leaves of the fig trees are as large as crow's feet.

In Perinthos most of the consumptives died in the spring in conjunction with winter coughs, so too, others who had chronic diseases became worse. At that time, too, in subclinical cases the diseases became evident, but there were others with chronic diseases of whom this was not true, so, for instance, those who had kidney pains <sup>7</sup>

of summer, and the coming on of summer removes those of winter <sup>6</sup>

*It is a very logical deduction that if the "constitution" of spring (i.e., the conditioning of the human organism by impacts of the environment of the time) was harmful, then the "constitution" of summer and autumn should prove helpful*

*A broad generalization is put forward the condition of the body (the state of the tissues and the body fluids) and this biological state or biotonus the result of environmental factors (season—endocrine rhythm—emotional upset—or other effectors) that disturb the normal equilibrium, the "vis medicatrix naturae" that governs the resistance of the body With such disturbance of equilibrium the clinical episode may be precipitated Once precipitated and the patient sick, such changes in condition will be reflected in the changing clinical picture for better or for worse*



"The wife of  
Kleomenes"



"The wife of  
Simos"

So, for instance, the wife of Kleomenes became nauseated and was generally fatigued when the south winds blew and would have pain in the left costal region starting in the neck and continued to the shoulders Hot flashes were followed by chilling and perspiration This continued, and temperature increased The pain was very severe She coughed, there was copious green expectoration, streaked with

blood The tongue was white, moderate bowel movements, the urine was dark in color On the forth day she menstruated copiously The cough diminished as did the expectoration and the pain, the febrile reaction was also mild <sup>8</sup>



*"Simos erected a beautiful memorial"*

On the other hand the wife of Simos was shaken during labor (to speed up delivery) and there followed pain in the chest as well as at the ribs She coughed up a certain amount of purulent material, consumption started and the fever lasted for six months Then she had repeated diarrhea, occasionally constipation She died after six or seven days <sup>9</sup>

### THE CLINICAL TYPES

There are three types of consumption

The first is associated with excretion of mucus The mucus coming

from the head has been corrupted (because of stasis), condensed and decayed, it is absorbed by the tiny dilated vessels and carried to the lung. There it is localized, the lungs immediately become diseased, being corrupted by the foul mucus. The patient has the following symptoms: at the very beginning he has a mild fever or chilling, some pain in the chest and back, sometimes a severe cough, usually there is marked expectoration of a rather fluid and salty sputum—all this at the beginning of the disease. Then the body becomes emaciated (apart from the calves—these, with the feet, are apt to be slightly swollen) and the finger nails show changes.

Particularly the shoulders become emaciated and weak, the trachea becomes filled with a foamy sputum and is apt to whistle. During this entire time patients are apt to be thirsty, feel very weak, and under such conditions they die miserably within a year.

One must nourish and care for such patients as well as possible and endeavor to improve their strength and build them up. Apart from drugs the patient is given boiled asses' milk (as a laxative) but particularly cow and goat milk, the former can be taken raw, diluted one-third with honey drink. This is given for forty-five days and sweet majoram can be added to this. For added nutriment one does not give too much oily, fatty, or highly spiced foods. Judge the condition of the patient when he takes short walks after meals, whether he feels chilly. In the winter he should be kept by the fire. He can drink small amounts of rather astringent red wine, preferably aged and well flavored. In association with a warm bath or a steam bath, he can take a purgative. If mild exercise is tolerated he can take short walks, otherwise should rest. All these things will tend to prolong his life, few, however, recover.

The second kind of consumption follows undue exertion.\* The

The tendency to chilling and febrile attacks, and shortness of breath with bodily exertion is a frequent indication of a tendency to consumption.<sup>10</sup> *The Greek physician observed the pulse rate and the respiratory rate very carefully.*

During the time of the Plerades there were relapses and some fevers continued. In the most severe fevers the pounding of the pulse was rapid and large and as they increased at night, they also increased with the severity of the weather. (EPIDEMICS IV, 20)

Frequent and small respiration indicates inflammation and disturbance in some of the major organs, large and prolonged respiration, mental disturbance with cramps,



symptoms are very much like the first but there are more intermissions and particularly in the summer there are remissions. The sputum is thicker. Cough bothers particularly old individuals. The pain in the chest may be more sharp. The patient may have the feeling as though a stone in his chest, he too may have pain in the chest. The skin is apt to be hydrated (i.e., pale and more translucent) and as soon as he exerts himself he develops a severe cough and dyspnea. Such patients are apt to die in about three years. The treatment is the same as just outlined but such patients usually die.

The third type of consumption the patient becomes darker in color and slightly distended, the supraorbital tissues acquire a yellowish tinge and even the subcutaneous vessels have a yellowish tinge although some are a darker red. The sputum is yellowish and the patient has attacks of smothering and at times cannot cough even though he wishes to. Occasionally he vomits with the coughing spell. The voice is sharper than normally and he has occasional chills and pain. One treats this patient as the others, the disease may continue for nine years or more but here, too, few recover.

### TREATMENT

One may attempt treatment in the following fashion. One starts out with a steam bath, on the following day about 15 liters of honey drink to which a little vinegar has been added is given and this is continued. For the main meal the patient is given barley cake, salt fish, crabs in large quantities (*iodine*?) with much sweet wine. A warm bath is given each morning with care to avoid chilling and the patient should sleep for as long a period as possible. Then he takes a long walk (*about 35 kilometers*), gradually increasing this each day until a maximum of 18 kilometers is reached.

In the second month bread is added to the diet as is pork and white wine, he is to walk not less than 55 kilometers before the meal and about 2 after, but he must not be chilled in so doing. If he carries out this (exercise) his resistance will increase.

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cold respiration—a fatal outcome. Furthermore large expiration, with small inspiration, and small expiration with large inspiration is bad, so, too, long drawn out or very rapid or imperceptible, as well as reduplicated in inhalation as in animals that are hunted, are all portentous (COAN PRENOTIONS, No 255)

In the third month a herb tea and wine of pomegranate is first given along with a pleasant tasting red wine, etc. Later a plentiful breakfast of bread, various fish, pork, etc. is added, the patient is to eat and sleep as much as possible, a steam bath is given every ten days or so.

In the fourth month this bath is given every fifth day and the patient is to be given much additional food including cheese, mutton, etc. The patient continues his exercise, beginning with about 2 kilometers the first day of the fourth month and increasing to 15 (this being distributed so that he walks 5 before the main meal, 3.5 after it and some 5.5 early in the morning). In the interval he is to eat barley and wheat bread, cartilaginous fish, all kinds of meat except beef or pork. He drinks milk and wine.<sup>11</sup>

In treating the tuberculous patient the metabolism should not be unduly increased<sup>12</sup> and he therefore should not be chilled [*Note H*].

Generally favorable clinical signs include the following: (1) the sputum should come up readily, should be white and uniform and of the same color without evidence of inflammation,\* (2) there should be little fever or only so much that interference with appetite is not marked and that the patient will not have great thirst, (3) the gastrointestinal activity should be normal, the stools firm and corresponding to the amount ingested, (4) the patient should not be emaciated, (5) constitutionally, a broad hairy chest is desirable, [*Note I*] the cartilages should be short and well fleshed, individuals who have this constitution are more apt to recover.

### COMPLICATIONS

Young people who develop empyema following an illness or as the result of a cavity or for any other reason do not recover unless they have some very favorable signs. They are apt to die in the autumn at the same time when other long-continued illnesses are apt to end fatally. Young women in particular and women in general are more apt to die if the consumption takes its beginning with symptoms that involve the menstrual flow [*Note J*]. For a favorable prognosis

\* One may get some further information by determining the specific gravity of the sputum.<sup>1</sup> If you put sputum from a consumptive into sea water and it sinks, the patient's prognosis is poor.<sup>13</sup>

in young women, a number of good signs must be apparent

An empyema may also take origin as follows

If rupture of one of the small vessels occurs—frequently as a result of exertion—a small amount of blood flows, much if it is a large vessel,\* less from a small one The patient immediately expectorates blood If the vessel doesn't close the blood collects in the lung and decomposes and the patient then expectorates pus mixed with blood in proportion If the vessel continues to bleed, hemoptysis may continue Pus may be expectorated in greater quantity because of the mucus (*inflammatory reaction*) that is attracted and undergoes decomposition

The patient, if treated before bleeding has occurred from the vessels or before the tone is lost, before the patient has become emaciated and is bed ridden, before the head and body have wasted away, can be freed from the disease But if he has been neglected during the initial state and he then has all these handicaps, he succumbs, either because of the progression of the disease or because of repeated hemorrhages and blood loss

If the little vessel is not completely torn and only a small aneurysmal dilatation occurs—usually a small varix—this condition at the beginning causes mild pain and dry cough but if it continues for a long time and is neglected, the vessel ultimately bleeds, first a little and dark blood—later more and fresh blood, then a purulent exudate follows and the patient progresses as described before In such patients, if they can be treated early, it is advisable to do a venesection and to institute a regimen by means of which the involved vessel will become relatively dry and bloodless

A comparable state may be found in the small vessels of the inner surface of the pleura Here, too, in patients who complain of pain, varices may occur and the vessels may be dilated If the patient is neglected such vessels may rupture, occasionally such patients may have hemoptysis or may develop an empyema and thus perish If

\* If after a pulmonary hemorrhage large masses of black blood pass from the gastro intestinal tract or if this is bright red, the patient is apt to have a second hemorrhage four or five days later He may then become somnolent and is apt to die after further masses of black material have been passed and the abdomen has been distended (COAN PRENOTIONS, No 324)

treated early the vessels become smaller and assume their proper relation to the pleura

*And we say the Greeks did not do post mortem examinations*<sup>14</sup>

Patients who, following a pulmonary hemorrhage, develop empyema (*whether in men or young women*) sometimes recover, however, the physician who makes a prognosis in these cases must take all factors into consideration

Individuals who have a tendency to pulmonary hemorrhages [*Note K*] are apt to be of a melancholic disposition (slender types), have pain in the back and in the breast. If these pains diminish after the hemorrhage they are not so liable to have severe cough nor does the fever bother them so much, however, repeated hemorrhage may take place in these cases if recovery is not prompt. If pains continue in the chest and the patient becomes emaciated and coughs a great deal and is dyspneic without much fever and without much evidence of purulent accumulation in the chest, the physician should inquire whether or not firm particles with an evil odor have been brought up with coughing and dyspnea<sup>15</sup>

If the trachea becomes ulcerated, the patient may have but a mild fever with pain in the middle of the chest and itching, the voice becomes hoarse, there is semi-fluid sputum which is occasionally thick and mucoid. There may be a fish-like odor about the mouth, **SOMETIMES THERE ARE LITTLE CONCRETIONS IN THE SPUTUM**

The patient becomes emaciated, the face and cheeks flushed, the nails dry and yellow. In such a patient death follows, frequently in association with the expectoration of blood and pus<sup>16</sup>

If the lesion in the lung is unconcocted (firm and not ulcerated) [*Note L*] it causes mild pain and a dry cough but as soon as it has become concocted (*ulcerates*) pain both anteriorly and posteriorly is more marked, fever occurs and a marked cough. If this process takes place very rapidly the material may be coughed up

If this cavity is small, it may shrink and dry and then the individual will be cured, if, however, the process takes place rapidly and the inflamma-



*"The patient becomes emaciated"*

tion is very marked, the cavity does not heal and dry, then the pus spreads in the region and the process is fatal

In spite of the fact that the patient remains conscious, he gradually becomes dehydrated, cold, and all the small blood vessels in the body close (*contract*) because the blood has been used up by the fever, particularly because of its duration and the severity of the disease Ultimately the patient dies <sup>17</sup>

If the discharge (*sputum of the tuberculous individual*) passes through the esophagus into the abdomen a diarrhea may result but the viscera do not necessarily become sick If the mucus stagnates there may be constipation and the chronic form of the disease

In others the (*foul*) mucus from the head may pass at the pharynx If much flows for a considerable period of time, consumption results, the lungs become filled with mucus and pus forms This attacks and digests the lung tissue and few recover THE PHYSICIAN, NO MATTER HOW SKILLFUL AND CLEVER HE MAY BE, IS BAFFLED BY THE UNKNOWN CAUSE OF THE DISEASE.

## TUBERCULOSIS OF THE BONES



"Consumption of the spine starts in the back"

Another form of the disease follows the absorption of the flow from the head into the vessels and reaches the spinal marrow, from there it reaches the sacrum

So too the hip may be involved When disease occurs there the bone undergoes necrosis and the patient has a rapid decline, he no longer wants to live, is fatigued, following the disease in the hip, the feet and legs become involved The disease continues despite careful nursing The patients become weak and die <sup>18</sup> [Note M]

Consumption of the spine starts in the back The patients usually have no fever, they eat well but they become emaciated When one inquires of such patients they say that they have a sensation as though ants were running along the spinal canal Often they are impotent, on the other hand, there are marked sexual dreams On running or walking the patient is

apt to become short of breath, feels weak, has pain as well as heaviness in the head and ringing in the ears<sup>19</sup>

Now that we have reached the discussion of Pott's disease we might follow Hippocrates' anatomical dissertation, for one should first get a knowledge of the structure of the spine,\* for this is also requisite for many diseases

Now on the side turned towards the body cavity, the vertebrae are fitted evenly to one another and bound together by a mucous and ligamentous connection extending from the cartilages (*intervertebral cartilage refers to its mucous center and cartilaginous anterior layer*) right to the spinal cord. There are also certain ligamentous cords extending all along, attached on either side of them. The communications of the veins and arteries will be described elsewhere as regards their number, nature, origin, endings, connections and functions. Posteriorly, the vertebrae are connected with one another by hinge-like joints. Cords common to them all are stretched along both the inner and outer sides (*Hippocrates' terms "inner" and "outer" correspond to our "front" and "back"*). From every vertebra there is an outgrowth (*apophysis*) of bone posteriorly, one from each, both the larger and smaller, upon the apophyses are epiphyses of cartilage, and from these there is an outgrowth of tendons, which are in relation with the outermost cords. The ribs are articulated severally with each of the vertebrae, their heads being disposed rather inwards than outwards. Man's ribs are the most curved, and they are bandy-shaped. As to the part between the ribs and the bony outgrowths of the vertebrae, it is filled on each side by the muscles which begin at the neck and extend to the attachment (of the diaphragm). The spine itself is curved vertically through its length. From the sacrum to the great vertebra (*fifth lumbar*) near which the origin of the legs is inserted, all this is curved outwards, for the bladder, generative organs, and

\* I have included the very accurate descriptions of the spine and of the shoulder joint to illustrate the excellence of the Greek knowledge of anatomy. They are characteristic of the best of descriptive science of the time. Withington, in his introduction to the third volume of the Jones TRANSLATIONS OF THE HIPPOCRATIC TEXTS states that "if we may trust Galienus Aurelianus, the distinction between arteries and veins was known to Eurypnon, who antedated Hippocrates, while the writer's ability to give a good account of the shoulder joint and the spine is only what we would expect from what Galen said about the anatomical studies of the old Asclepiadae."

loose part of the rectum are lodged there From this point to the attachment of the diaphragm it curves inwards, and this part only of the inside has attachments of muscles, which they call "psoas" From this to the great vertebra (*seventh cervical*?) over the shoulder-blades it is curved outwards, and seems to be more so than it is, for the ridge has the outgrowths of bone highest here, while above and below they are smaller The articulation of the neck itself is curved inwards<sup>20</sup>

In cases then of outward curvature at the vertebrae, a great thrusting-out and rupture of the articulation of one or more of them does not very often occur, but is rare Such injuries, indeed, are hard to produce, nor is it easy for outward thrusting to be brought about, unless a man were violently wounded from the front through the body cavity—and then he would perish—or if a man falling from a height came down on his buttocks or shoulders—but then he would die also, though he might not die at once<sup>21</sup>

If the spinal cord is involved as the result of a fall or for any other reason external or internal, the person develops legs that are weak to this extent that he has no sensory feeling at all and the belly and the urinary bladder is disturbed and at first neither feces nor urine are excreted unless there is artificial provocation If the disturbance lasts long the patient does not even know when urine and feces are excreted, shortly after that he will die<sup>22</sup>

Why then am I writing this? Because some think they have cured patients whose vertebrae had fallen inwards with complete disarticulation, and there are even some also who think this is the easiest distortion to recover from, not even requiring reduction, but that such injuries get well of themselves There are many ignorant practitioners, and they profit by their ignorance, for they get credit with their neighbors<sup>21</sup>

*We shall now go back to tuberculosis of the spine* when the spinal vertebrae are drawn into a hump by disease, most cases are incurable, especially when the hump is formed above the attachment of the diaphragm Some of those lower down are resolved when varicosities form in the legs, and still more when these are in the vein at the back of the knee In cases where curvatures resolve, varicosities may also arise in the groin, and, in some, prolonged dysentery causes resolu-

tion When hump-back occurs in children before the body has completed its growth, the legs and arms attain full size, but the body will not grow correspondingly at the spine, these parts are defective And where the hump is above the diaphragm, the ribs do not enlarge in breadth, but forwards, and the chest becomes pointed instead of broad (*as you have no doubt observed in the sculptured bust of Æsop*) the patients also get short of breath and hoarse, for the cavi-



*"Observed in the sculptured bust of Æsop"*

ties which receive and send out the breath have smaller capacity Besides, they are also obliged to hold the neck concave at the great vertebra (*second cervical, perhaps the seventh*), that the head may not be thrown forwards This, then, causes great constriction in the gullet, since it inclines inwards, for this bone, if it inclines inwards, causes difficult breathing even in undeformed persons, until it is pushed back In consequence of this attitude, such persons seem to have the larynx more projecting than the healthy THEY HAVE ALSO, AS A RULE, HARD AND UNRIPENED TUBERCLES IN THE LUNGS, FOR THE ORIGIN OF THE CURVATURE AND CONTRACTION IS IN MOST CASES DUE TO SUCH GATHERINGS, IN WHICH THE NEIGHBORING LIGAMENTS TAKE PART Cases where the curvature is below the diaphragm are sometimes complicated with affections of the kidneys and parts about the bladder, and besides there are purulent abscessions in



the lumbar region and about the groins, chronic and hard to cure, and neither of these causes resolution of the curvatures. The hips are still more attenuated in such cases than where the hump is high up, yet the spine as a whole is longer in these than in high curvatures. But the hair on the pubes and chin is later and more defective, and they are less capable of generation than those who have the hump higher up. When curvature comes on in persons whose bodily growth is complete, its occurrence produces an apparent crisis in the disease then present. In time, however, some of the same symptoms found in younger patients show themselves to a greater or lesser degree, but in general they are all less malignant. Many patients, too, have borne curvature well and with good health up to old age, especially those whose bodies tend to be fleshy and plump, but few even of these survive sixty years, and the majority are rather short-lived. There are some in whom the vertebrae are curved laterally to one side or the other. All such affections, or most of them, are due to gatherings on the inner side of the spine, while in some cases the positions the patients are accustomed to take in bed are accessory to the malady. BUT THESE WILL BE DISCUSSED AMONG CHRONIC DISEASES OF THE LUNG, FOR THE MOST SATISFACTORY PROGNOSSES AS TO THEIR ISSUE COME IN THAT DEPARTMENT.<sup>23</sup>

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*Again the last sentence reveals the grasp of the Hippocratic mind—prognosis will depend on the disease of the lung—where the hard and unripened tubercles in the lung that gave rise to the curvature of the spine would have much to do with the final outcome!*

*Hippocrates had all the answers but one. No matter how skillful or clever, he (the physician) is baffled by the unknown cause.<sup>24</sup>*

*That discovery was to be Koch's contribution, in the year 1882, some 2300 years later.*

## In the Medical Clinic—III



"There was the patient Silenus"

### *The Patient Who Lived on Broadway*

#### *Synopsis*

THE PATIENT SILENUS WHO LIVED  
ON BROADWAY *Respiration rare and  
large! Appendicitis Patients in Thasos Pre-  
menstrual psychosis 430 B C*

NOTE A—*Another Patient Who Lived on  
Broadway in Chicago, 1930 A D*

#### THE PATIENT WHO LIVED ON BROADWAY (CA 430 B C )

There was the patient Silenus, aged 20, who lived on Broadway  
(near the place of Eualcidas)

After overexertion, drinking and exercises at the wrong time he  
was attacked by fever

*This may do very well to start a series of case histories—  
for case histories and Broadways repeat themselves*

He began by having pain in the loins, with heaviness in the neck  
and tightness in the head From the bowels on the first day there  
passed copious discharge of bilious matter, unmixed, frothy and highly  
colored The urine was black, with a black sediment, there was thirst,  
the tongue was dry and the patient was sleepless

Second day—The fever was higher, stools were copious, thinner and  
frothy, the urine remained black, he had an uncomfortable night  
and was slightly delirious

Third day—There was a general exacerbation, with an oblong tightness of the hypochondrium extending on both sides of the navel, though the tissues were soft underneath, the stools were still thin and blackish, the urine, turbid and blackish, there was no sleep at night, the patient was irrational, rambling, laughing and singing, he had no power of restraining himself

Sixth day—The patient perspired slightly about the head, but the extremities were cold and livid, he tossed about restlessly, nothing passed from the bowels, urine was suppressed, fever was acute

Seventh day—Speechless, the extremities would not get warm, no urine was passed

Tenth day—took no drink, coma, fitful sleep, discharges from the bowels similar. He had a copious discharge of thickish urine, which on standing, left a farinaceous white deposit, the extremities were again cold

Eleventh day—Death

From the beginning the breath in this case was rare and large and there was continuous throbbing in the hypochondrium <sup>1</sup>

*Note particularly the description of the findings in abdominal palpation—oblong tightness of the hypochondrium, soft underneath extending on both sides to the navel. To Hippocrates this obviously suggested inflammation, with nothing hard or bulky immediately beneath the surface to cause this. Note, too, the respirations rare and large!\**

## PAIN IN THE RIGHT HYPOCHONDRIUM

Another man who dined when hot and drank too much vomited everything during the night, he had acute fever and pain in the right hypochondrium with inflammation, though there was a feeling of softness underneath the belly wall from the inner part. He had an uncomfortable night, the urine at first was thick and red, it did not settle on standing, the tongue was dry and there was great thirst. The fourth day there was acute fever with pain all over. On the

\* *The description of the different types of respiration is frequently emphasized as, for instance Breathing small, rapid, large, rare, small, infrequent, frequent, large, exhalation large, inhalation small, inhalation large, exhalation small, doubly interrupted inhalation, cold breath and warm breath* <sup>5</sup>

fifth day he passed much smooth oily urine. Death on the eleventh day.<sup>2</sup>

*Hippocrates did not recognize appendicitis as a clinical entity but he noted that it is best for the hypochondrium to be free from pain, soft, and with the right and left side even. But, wrote he, should it be inflamed, painful, distended, or should it have the right side uneven with the left—such signs are portentous*



*"Another man who died  
when hot"*

If there is a swelling of the hypochondrium and it is hard and painful, death rapidly results, when inflammation is general.<sup>3</sup>

*If there is localized suppuration, even if on the right side, this, though long continued, may finally result in recovery*

*His observations took another turn. The patient whose right bowel was painful became easier when arthritis supervened, but when this symptom was cured, the pains became worse.<sup>4</sup>*

*The influence of added foci of organ disturbance (i.e., the basis of derivative or modern non-specific therapy—the fixation abscess of Fochier, etc.) might alter the condition of the original clinical focus*

#### PATIENTS IN THASOS

*With Hippocrates we proceed to Thasos, to the bedside of the wife of Delearces*

She had suffered a severe grief, then had felt chilled and had a fever. She had wrapped herself up and without saying a word would fumble, pluck, scratch and pick hair, weep and then laugh, but she did not sleep. Despite laxatives and cathartics she was constipated

When the nurses insisted, she drank a little The urine flow was scanty, there was slight fever, but the extremities were cold

On the ninth day after the onset of her illness there was much wandering, with later return to reason, but she remained silent

On the fourteenth day it was noted that respirations were rare, very large, with long intervals between and then might be very short



*"The wife of Delearches"*

From the seventeenth day, under stimulation, the bowels passed some unformed stool, after that there was fluid evacuation—indeed every drink passed unchanged—nothing was formed The patient noticed nothing, the skin was tense and dry

On the twentieth day there was again much rambling followed by lucid intervals, but she remained speechless The respirations were short

She died the following day<sup>6</sup>

The respiration of the patient throughout was rare and large  
*Note the precipitation of the acute episode after grief, and the fact that the Kussmaul respiration is carefully singled out as a clinical symptom worthy of comment*

### A PREMENSTRUAL PSYCHOSIS

In Thasos, a woman of gloomy temperament, after a grief with a reason for it, without taking to bed lost sleep and appetite, and suffered thirst and nausea. She lived near the place of Pylades on the plain.

First day As night began there were fears, much rambling, depression and slight feverishness. Early in the morning frequent convulsions, whenever these frequent convulsions intermitted, she wandered and uttered obscenities, many pains, severe and continuous.

Second day Same symptoms, no sleep, fever more acute.

Third day The convulsions ceased, but were succeeded by coma and oppression, followed in turn by wakefulness. She would jump up, could not restrain herself, wandered a great deal, fever acute, on this night a copious, hot sweating all over, no fever, slept, was perfectly rational and had a crisis. About the third day urine black and thin, with particles mostly round floating in it, which did not settle. Near the crisis copious menstruation.<sup>7</sup>

Near the crisis, copious menstruation<sup>1</sup>

*The psychopathic patient offers exceptional opportunities to study the influence of the unstable humoral balance. Here at least two disturbing factors are brought into play—a grief with a reason for it—and the premenstrual endocrine and autonomic imbalance. Both influence the vascularization of the brain and when the vascularization of a potentially inadequate brain is disturbed the dysfunction is at once apparent in abnormal behavior. [See the Note A "Another Patient Who Lived on Broadway"]*

THE DISEASED STATE RESULTS FROM POWERS (the forces that alter the body condition, i e., cause humoral changes) AND FROM STRUCTURES wrote Hippocrates<sup>8</sup>

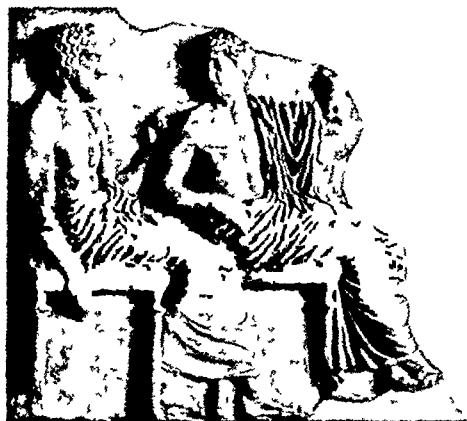


"In Thasos, a woman of gloomy temperament"

# In the Surgery—I

## *The Art*

### *Synopsis*



*"We had taken seats in the amphitheatre"*

**HIPPOCRATIC INTRODUCTION** *The teaching of medicine Medical literature, conduct, practice, attitude Examination Surgery The operating room, assistants, apparatus Importance of the bandage The treatment of club foot*

**NOTES**—*Surgery Teaching of Anatomy Critical Days Seven Come-Eleven Circulation*

### THE TEACHING OF MEDICINE

*We had taken seats in the white marble amphitheatre that was attached to the surgical dispensary, for Hippocrates had announced a lecture-demonstration [Note A] Polybus\* was the first assistant, with others in attendance. One of them was scrubbing up, carefully cleaning his nails. The other was examining the linen bandages, three men attendants were arranging instruments, one boiling water, a clerk was in attendance, with tablets in a neat pile.*

*Hippocrates was seated. A closely fitting gown of white linen, which left the arms bare to the elbows, had replaced his ordinary kiton. Light came from above, from a large central opening in the rather low roof, the whole covered by a screen of white Coan silk†*

*It was the first lecture for a new group of students and he began as follows. He who is going truly to acquire an understanding of*

\* Hippocrates' son in law and probable author of some of the texts

† Cos was famed for its fine and very sheer silk

medicine must enjoy natural ability, teaching, a suitable place, instruction from childhood, diligence, and time. Now first of all natural ability is necessary, for if nature be in opposition everything is in vain. But when nature points the way to what is best, then comes the



*"A clerk was in attendance"*

teaching of the art. This must be acquired intelligently by one who, from a child has been instructed in a place naturally suitable for learning. Moreover he must apply diligence for a long period in order that learning, becoming second nature, may reap a fine and abundant harvest.

The learning of medicine may be likened to the growth of plants. Our natural ability is the soil. The views of our teachers are as it were the seeds. Learning from childhood [Note B] is analogous to the seeds' falling betimes upon the prepared ground. The place of instruction is as it were the nutriment that comes from the surrounding air to the things sown. Diligence is the working of the soil. Time strengthens all these things, so that their nurture is perfected.

These are the conditions that we must allow the art of medicine, and we must acquire of it a real knowledge before we travel from city to city and win the reputation of being physicians not only in word but also in deed. Inexperience on the other hand is a cursed treasure and store for those that have it, whether asleep or awake, it is a stranger to confidence and joy, and a nurse of cowardice and of rashness. Cowardice indicates powerlessness, rashness indicates want of art. THERE ARE IN FACT TWO THINGS, SCIENCE AND OPINION, THE FORMER BEGETS KNOWLEDGE, THE LATTER IGNORANCE.<sup>1</sup>



*"Learning from childhood"*

## WISDOM

Not without reason are those who present as useful for many things WISDOM, that is, wisdom applied to life. Most kinds of wisdom, indeed, have manifestly come into being as superfluities, I mean those which confer no advantage upon the objects that they discuss. Parts thereof may be tolerated up to the point where idleness is not, neither is there evil. Idleness and lack of occupation tend—nay are dragged—towards evil. Alertness, however, and exercise of the intellect,\* bring with them something that helps to make life beautiful. I leave out of account mere talk that leads to no useful purpose. More gracious is wisdom that even with some other object has been fashioned into an art, provided that it be an art directed towards decorum and good repute.

ANY WISDOM, IN FACT, WHEREIN WORKS SOME SCIENTIFIC METHOD, IS HONOURABLE IF IT BE NOT TAINTED WITH BASE LOVE OF GAIN AND UNSEEMLINESS.<sup>3</sup>

Naturally knowledge of the medical literature is one of the most important branches of medicine, he who can make use of this will not go far astray in his art.<sup>4</sup>

\* Exercise is useful for muscles and the extremities—sleep for the gut. THINKING IS WANDERING OF THE SOUL (*i e., exercise!*)<sup>2</sup>

*I take it for granted that you have natural ability as well as those attributes of character and scholarship that are prerequisites in our profession* For in the art, as in wisdom, use is not a thing that can be taught <sup>5</sup>

*Both as students and as practitioners* dress decorous and simple, not over-elaborated, but aiming rather at good repute Be serious, artless, with those who are of like mind quick-witted and affable, good-tempered towards all, silent in face of disturbances, in the face of silence ready to reason and endure, prepared for an opportunity and quick to take it, knowing how to use food and temperate, patient in waiting for an opportunity, setting out in effectual language everything that has been shown forth, graceful in speed, gracious in disposition, strong in the reputation that these qualities bring, turning to the truth when a thing has been shown to be true <sup>6</sup>

*Remember that* reasoning that comes as the result of work that has been taught is a good thing, for everything that has been done artistically has been performed as the result of reasoning But when a thing is not done, but only expressed artistically, it indicates method divorced from art (*technique*) For to hold opinions, without putting them into action, is a sign of want of education and of want of art

Where understanding is on a par with action, knowledge at once makes plain the end In some cases time has put the art on the right track, or has made clear the means of approach to those who have chanced upon the like route <sup>7</sup>

*As little as possible should however be left to chance, and in this you can only succeed if you take many factors into consideration* So, for instance, one must know accurately the character of the season, and of each individual disease, know what is favorable or unfavorable in the character (of the season) and of the illness, what diseases are protracted and fatal, what protracted and curable, which have a short fatal course or a short course that leads to recovery

On the basis of this knowledge one can readily observe the sequence of critical days [*Note C*] and determine the prognosis So, too, determine when and in what way treatment is to be instituted <sup>8</sup>

Failure to observe the proper season for help gives the disease a start and kills the patient, as there was nothing to relieve him For when many things together produce a result, there is difficulty Se-

quences of single phenomena are more manageable, and more easily learned by experience<sup>9</sup>

*Do not forget to keep a watch on the faults of the patients, which often make them lie about the taking of things prescribed For through not taking disagreeable drinks, purgative or other, they sometimes die What they have done never results in a confession, but the blame is thrown upon the physician*<sup>10</sup>

Perform all your manipulations calmly and adroitly, concealing [Note D] most things from the patient while you are attending to him Give necessary orders with cheerfulness and serenity, turning his attention away from what is being done to him, sometimes reprove sharply and emphatically, and sometimes comfort with solicitude and attention, revealing nothing of the patient's future or present condition For many patients through this cause have taken a turn for the worse, I mean by the declaration I have mentioned, of what is present, or by a forecast of what is to come<sup>11</sup>

*Hippocrates, who talked directly, intently, clearly, had risen from his seat and slowly paced the floor The assistants had, in the meantime, settled themselves comfortably on wooden chairs Hippocrates ceased for a moment, then changed the subject*

## EXAMINATION OF THE PATIENT

*Now let us be very practical, gentlemen To be true physicians you must first be craftsmen, then know the art, then ask nature the whys and wherefores Then you become scientists*

*I take it for granted that you know something of physical examination, that you will know how to look for what is like and unlike the normal, beginning with the most marked signs and those easiest to recognize, open to all kinds of investigation, which can be seen, touched and heard, which are open to all our senses Sight, touch, hearing, the nose, the tongue and the understanding, which can be known by all our sources of knowledge*

*Make note of the smallest changes For instance, if the patient had a sore before the illness, or if a sore arises during it, pay great at-*

tention, for if the sick man is going to die, before death it will be either livid and dry or pale and hard <sup>12</sup>



*"Know how to look for what is like  
and unlike the normal"*

## SURGICAL TECHNIQUE

*Well, we have finally arrived at something surgical, even if it is only a sore [Note E], it will illustrate the usefulness of close observation*

*Now we will proceed to some technical matters*

*To do surgery* we must first have a patient, there must be an operator, an assistant, instruments, we must know something about the light and arrange the light (where and how it is placed), the instruments, their number, how we are to use them and when, we must have other apparatus

As far as the operator is concerned, he can do his work either seated or standing, but everything should be placed conveniently to himself, to the part that is being operated upon and to the light

There are two kinds of light, the ordinary and the artificial and

while the ordinary is not in our power, the artificial is in our power. Each may be used in two ways, i e , as direct light or as oblique light. We do not use oblique light very often. With direct light so far as available and beneficial, we turn the part operated upon toward the brightest light. Thus while the part operated upon faces the light the surgeon faces the part but not so as to overshadow it. In this way the operator will get a good view and the parts treated will not be exposed to view.

*Note that I have covered the direct light from the sky with a screen of Coan silk. This diffuses the light and with it we do not have shadows.*

When you are seated before your patient your feet should be in a vertical line straight up as regards the knees, and be brought together with a slight interval. The knees should be a little higher than the groins and the interval between them such as may support and leave room for the elbows. If you are standing, make your examination with both your feet fairly level, operate with the weight on one foot and not that on the side of the hand in use. *Thus you will tire less readily.*

Let your patient assist the surgeon with the other part of his body standing, sitting, or lying so as to maintain most easily the proper posture, and he must be on his guard to avoid slipping, or collapse or displacement so that the position and form of the part treated may be properly preserved during the presentation and the operation and afterwards.

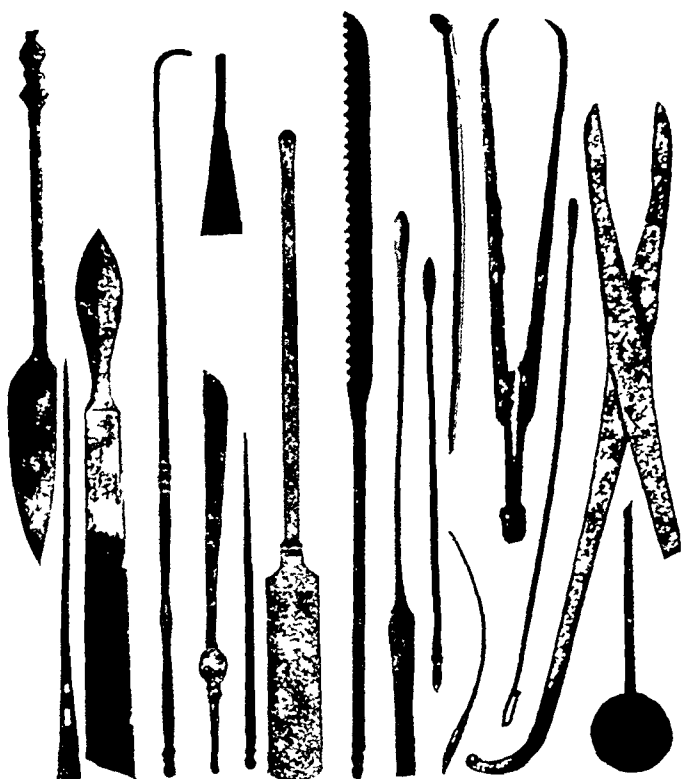
It will be good to practice using your finger ends, especially with the forefinger opposed to the thumb, with the whole hand help palm downwards and both hands opposed. *This practice of your hand is extremely important but I know that you have already had some experience in dissecting animals and operating upon them.*

Practice all the operations, performing them with each hand and with both together—for they are both alike—your object being to attain ability, grace, speed, painlessness, elegance and readiness.

As to the instruments, the time and the manner of their use will be discussed later. Their proper position is such as neither to be in the way of the operation nor to be out of the way when wanted, their place is by the operator's hand but if an assistant gives them, let him

be ready a little beforehand, and act when you bid him—*that is the mark of a good assistant!*

*Let your staff see to it* that the patient presents the part for operation as you want it, holding fast the rest of the body so that it will be all steady, keeping silence and obeying the superior



*"As to the instruments"*

## BANDAGING

*One of the most important things that you should learn early is bandaging* There are two aspects the completed bandage and also its process and application As regards application, you should keep in mind speed and painlessness, depending on the resources available and keeping in consideration neatness Naturally as far as the operation is concerned it is important speedily to bring it to an end, to do it as painlessly as possible with ease, to have resources ready for any emergency, and it should be so completed with neatness that it may

be pleasant to look at I have already mentioned that exercises *and experience* are essential in attaining these ends *and opportunity will be provided you*

Completed bandaging should be well and neatly done Neatly means smoothly, well distributed, evenly and alike where the parts are even and similar, and unevenly and unlike where they are unlike and uneven

There are bandages of various kinds the simple (circular), oblique (adze-like), the very oblique (reversed), the eye, the rhomb and the



*Warriors Bandaging*

half-rhomb—you must use the form that is suited to the shape and affection of the part bandaged

When I say bandaging must be well done, the term "well" has two aspects when applied to the part bandaged first, firmness, which is obtained either by tension or by the number of bandages The bandage may either cure by itself or assist the curative processes There is a rule for this and it includes the most important elements of bandaging Pressure so that the applications neither fall away nor are very tight, fitting to the part without forcible compression, less at the end and least in the middle is an important point Knot and thread sutures that are carried upward and not downward in presentation The ends (that are to be tied) are to be put, not over the wound, but where the knot is to be, where there is neither friction nor motion The knot and the suture should be soft and not large It is well to bear in mind that every bandage has a tendency to slip towards the de-

pendent and conical part, such as the top of the head or the bottom of the leg. Bandage parts on the right side towards the left, those on the left, to the right, except the head—this you do vertically.

As to the mobile parts, such as the joints, where there is flexion, the turns should be as few and as contracted as possible, as with the back of the knee, but where the part is extended, like the knee cap, spread out and make the bandage broad. Make additional turns both to hold fast applications in these parts, and to support the dressing in the fixed and flatter parts of the body, such as those above and below the knee.

In the case of the shoulder (*which I shall discuss later*) a turn about the opposite armpit is suitable, and for the leg, the part above the calf. Where it is not easy to get either good fixation or support with the bandages, make supports with threaded sutures in loops or a continuous suture.

Bandages should be clean, light, soft and thin. You should begin to practice the rolling with both hands at once and with each separately. Start in tomorrow and use one of suitable size, estimating by the thickness and the breadth of the part. The edges of the roll should be firm and not frayed and without creases.

Generally we use an outer and an under bandage. The function of the under bandage is to bring together what is separated, to reduce everted wounds, to separate what is adherent, and to adjust what is distorted or the reverse. It is best to use linen bandages that are light and thin and soft and clean and broad, that are without sutures or projections and sound so as to bear the tension required and a little stronger. They need not be dry but can be soaked in a liquid suited to each case.

Close a sinus so that the upper part touches the base without pressing on it, begin bandaging from the sound part and end at the open wound so that while the contents are pressed out no more is accumulating. Bandage the vertical ones in a vertical position and the oblique, obliquely, in a position causing no pain but without compression nor laxity so that when the change is made to a sling or fixation the muscles, vessels, ligaments and bones will retain their normal position (in which they are best put up and supported). Let the part be slung or put up in a natural comfortable position. *Do not forget that*



*word comfortable* The amount should be sufficient to deal with the lesion, without either pressing on the splints, or becoming burdensome, or slipping around, or causing weakness As to the length and breadth, three, four, five or six cubits (18 m) for length, fingers for breadth The supporting bands in such a number of coils not to compress, soft and not thick When using splints they should be smooth, even, tapering at the ends, a little shorter in each direction than the bandaging, thickest over the prominence at the fracture, avoiding either by position or shortening the convexities naturally uncovered by flesh such as on the fingers and ankles Fit them on by supporting bands without pressure Let the first dressing be made with bandages rolled in soft, smooth and clean cerate (*wax*)

### WET DRESSINGS AND MASSAGE

Occasionally you may use water with your dressings, the temperature to be determined by pouring it over your own hand As far as the quantity needed for relaxation and attenuation the more the better, but for flesh forming and softening observe moderation, and for moderate douching one should stop while the part is still swollen up before it collapses, for it first swells and then becomes attenuated *Later we shall take up the treatment of fractures but I should like to mention immediately that* extention should be made most when the largest and thickest and when both bones (*of the arm*) are broken, next in cases where it is the underneath one (*the ulna*), least where it is the upper Excessive tension does damage except in children *because then tendons are more elastic* It is well to keep the limb a little raised As a model for adjustment take homonymous *i e*, the similar or sound limb

To produce more relaxation, friction (*massage*) will do it, constriction will cause increase of flesh (*edema*) and attenuation A certain amount of friction is therefore useful, very hard friction constricts, whereas soft relaxes, if long continued it attenuates, but if moderate, it increases flesh

Now as to the first bandaging The patient should say there is pressure chiefly over the injury, least at the ends, he should say that the dressing fits firmly but without compression, pressure should be got by the amount of bandaging and not by tension During this first

day and night pressure should increase a little, but be less during the next day, and it should be lax on the third. A soft swelling should be found on the second day at the extremity. On the third, the part when unbandaged should be less swollen, and so with every dressing. At the second dressing one must find out whether it seems properly done, and then you use more bandages and greater pressure, at the third still more with more coils of bandage. On the seventh day after the first dressing, the parts when set free should be found without swelling and the bones mobile. When put up in splints, if the parts are not swollen and are free from itching or wound, leave them alone until twenty days after the injury, but if there is any suspicion, remove in the interval. Make the splints firm about every third day. Remember, too, that use strengthens and disuse debilitates, that is why massage is very useful.<sup>13</sup>

### CLUB FOOT

*I would like to insist that you keep in mind the importance of these simple technical matters that I have been discussing because, with proper bandaging, proper instruments and apparatus of this sort, one can bring about amazing adjustment.* So, for instance, there are certain congenital displacements which, when they are slight, can be reduced to their natural position, especially those of the foot-joints. When properly treated in the method that I shall explain to you there is no need for incision, cautery, or complicated methods, for such cases yield to treatment more rapidly than one would think. Of course, time is required for complete success, until the part has acquired growth in its proper position. Take, for instance, cases of congenital club foot which are for the most part curable if the deviation is not very great or the children advanced in growth. Therefore it is best to treat such cases as soon as possible, before there is any very great deficiency in the bones of the foot, and before the like occurs in the tissues of the leg. Now the mode of club-foot is not one, but manifold, and most cases are not the result of complete dislocation, but are deformities due to the constant retention of the foot in a contracted position. The things to bear in mind in treatment are the following: push back and adjust the bone of the leg at the ankle from without inwards, making counter-pressure outwards

on the bone of the heel where it comes in line with the leg, so as to bring together the bones which project at the middle and side of the foot, at the same time, bend inwards and rotate the toes all together, including the big toe Dress with cerate well stiffened with resin, pads and soft bandages, sufficiently numerous, but without too much compression Bring round the turns of the bandaging in a way corresponding with the manual adjustment of the foot, so that the latter has an inclination somewhat towards splay-footedness A sole should be made of not too stiff leather or of lead, and should be bound on as well, not immediately on to the skin, but just when you are going to apply the last dressings In a word, as in wax modeling, one should bring the parts into their true natural position, both those that are twisted and those that are abnormally contracted, adjusting them in this way both with the hands and by bandaging in like manner, but draw them into position by gentle means, and not violently Sew on the bandages so as to give the appropriate support, for different forms of lameness require different kinds of support A leaden shoe shaped as the Chian boots used to be, might be made, and fastened on outside the dressing, but this is quite unnecessary if the manual adjustment, the dressing with bandages, and the contrivance for drawing up are properly done

When the time has come for footwear, the most suitable are the so-called "mud-shoes," for this kind of boot yields least to the foot, indeed, the foot rather yields to it The Cretan form of footwear is also suitable<sup>14</sup> (*reaching to the middle of the leg*)



## CHAPTER IX

# In the Surgery - II

## *Practice—Surgery of the Skull*

### *Synopsis*

*FULMINATING INFECTION* The death of the cobbler

*Glands and their significance*

*Skull injury Examination Surgical treatment The black solution Necrosis of the bone*

*Trephining—indications and technique The ear Brain involvement Other ear disturbances on a vascular basis*

*Multiple sclerosis Headache Scotoma*



*"The cobbler stuck his thigh with the awl"*

On the following day Hippocrates came in late and after a short discussion with the first assistant, turned to us and, without preliminary introduction, began as follows *I have just come from the death-bed of a cobbler. A few days ago he was perfectly well. In the afternoon, possibly because he was tired, he stuck his thigh with the awl while sewing a heavy sole. It penetrated the flesh above the knee and I think the awl went in at least a finger length.*

The wound did not bleed\* and apparently healed rapidly, two days ago the entire thigh began to swell all the way up to the inguinal region. *He had a very high fever and this morning he had a severe chill, after that he died.*<sup>1</sup>

*When I came away from the home I could not help but think that this humble cobbler carried on an occupation of the same nature as ours. For cobblers divide wholes into parts and make the parts whole,*

\* The most favorable wounds are those that are neither followed by bleeding or by fever and where the wound is neither painful nor inflamed. If any of these signs should occur IT IS BEST TO HAVE THEM OCCUR EARLY. As far as pain and inflammation is concerned it is the wound itself which is involved.<sup>2</sup>

cutting and stitching they make sound what is rotten. Man too has the same experience. Wholes are divided into parts, and from the union of parts wholes are formed. By stitching and cutting, that which is rotten in men is healed by physicians. This too is part of the physician's art: to do away with that which causes pain, and by taking away the cause of his suffering to make him sound. Nature of herself knows how to do these things.<sup>2</sup>



*"The niece of our  
townsman  
Temenes"*

*This severe course of the cobbler reminds me of another case that I saw some time ago.* The patient was the niece of our townsman Temenes. She had been short of breath because of some pulmonary disturbance and the subcostal region was particularly tense at times. Whether she was pregnant or not I do not know. First she was constipated, then she had the tendency to vomit.

There were copious mucous bowel movements but no discomfort in the lower abdomen. After eleven days the thumb of the right hand became inflamed. The patient developed severe nausea and diarrhea, then improvement followed, her weakness diminished, as did the fever, respiration became less labored after she had vomited foul masses. On the sixteenth day the swelling of the thumb diminished, respiratory rate and fever increased and she died. She had had fever



*"the thumb of the  
right hand became  
inflamed"*

before this pus accumulated and she died on the seventh day after the accumulation of pus. She, too, was among those patients who had marked erythema of the skin (*erysipelas*?)<sup>4</sup>

## GLANDS

*In connection with such inflammation I want to call your attention to the glands that may frequently be involved*

Glands are scattered throughout the body in large numbers, in the cavities, around the joints, around the superficial regions with much vascularization. They have the purpose of gathering together normal, as well as pathological exudates that occur during diseases, whereby they squeeze out superfluous fluid so there is no surplus in any part of the body, or even if such a surplus occurs for the moment, ultimately the glands absorb and take care of it<sup>5</sup>

Glands in general have a spongy consistency, they are loosely organized, rich in fluid, and differ from other tissues of the body, being rather crumbly and have many blood vessels which bleed freely. They are usually white in color and more or less slimy and have a cottony feeling. They swell markedly, become raised, and the whole body is febrile. They undergo this change when they are filled with fluid which drains in from the rest of the tissues through the blood vessels, fluid readily enters into them. If this drainage is rich and thick the glands attract the rest of the body to it. If fever follows, the glands swell and become inflamed<sup>6</sup>

These swellings, particularly swelling of the nodes, reveal the seat of the disease (blastemata) but they have other significance, particularly those which are seen about the gut, which may be malignant<sup>7</sup>

There are many glands around the gastrointestinal tract, particularly in and about the omentum. Those about the gastrointestinal tract are the largest in the body. They absorb the excess fluids and press it out again<sup>8</sup>

In this fashion they utilize such surplus material from the rest of the body. In any region, therefore, one finds glands. They occur, for instance, below the ears, right and left side of the major vessels of

## HIPPOCRATIC WISDOM

the neck and the axilla, in the groin and pubic region <sup>9</sup>  
 In women the constitution of the glands is in general softer and looser than in males. In males, too, they are not so large <sup>10</sup>

Under normal conditions the exudates from the skin are not great in amount and are taken care of by the ordinary glands. If, however, an inflammatory exudate occurs in the head which is irritating and flows through the tonsil and stagnates there, they become inflamed. The glands then increase in size and the throat becomes narrower and the inflammation may extend to the ears. Sometimes both sides are involved, sometimes only one side. If the excretion is mucopurulent and tenacious, then inflammation follows the stagnation of this fluid and knots of glands appear in the neck <sup>11</sup>

I have observed an interesting thing in connection with inflammation in general, also true of the lymph glands, namely, that anything that suppurates remains without relapse because suppuration is digestion, decision and removal <sup>12</sup>. Of course you can hasten suppuration by heat or by making applications of sea salt with honey <sup>13</sup>  
*And don't forget that* in all these swellings pain, as well as fever, occur when pus is forming rather than when it has formed

## SKULL INJURIES

*A sailor was brought to the surgery yesterday with a severely lacerated scalp, the wound having been inflicted when his head was struck by the blade of an oar that fell from the top of the big trimme. The oar hit the top of his head when he was casting the hawser over to the landing pier at the harbor. There was some doubt in my mind whether he had a real fracture so I applied some of the black "PATH-FINDER" and we shall shortly see the results when they bring in the patient*



*The Sailor*

The first thing to look for in the wounded man is whereabouts in the head the wound is, whether in the stronger or weaker part, and to examine the hair about the lesion, whether it has been cut through

by the weapon and gone into the wound. If this is so, declare that it is likely that the bone is denuded of flesh and injured in some way by the blow. One should say this at first inspection without touching the patient.

In the case of contusions and fractures which do not appear in the bones, though they are there, you should first try to distinguish by the patient's report whether the skull has or has not suffered in these ways.

Then test the matter by reasoning and examination, avoiding the probe, for probing does not prove whether the bone has or has not suffered one of these evils, and what is the result. What probing proves is the existence of a hedra or weapon mark, or whether the skull has a contused fracture with depression, or is badly broken, things which are also clearly obvious to ocular inspection.<sup>14</sup>

*I know that you are more interested in an operation than in almost anything else in your medical studies and in this particular patient we may have to consider the possible indications for opening the skull—that is for trephining.*

First of all let me discuss my views of the treatment of wounds in the head, and the way to discover affections of the skull which are not manifest.

A lesion in the head should not be moistened with anything, not even wine, much less anything else, nor should the treatment include plasters or plugging, nor ought one to bandage a lesion in the head, unless it is on the forehead or in the part devoid of hair, or about the eyebrow or eye.

Incisions may be safely made by the surgeon in any other part of the head, but he should not incise the temple, or the part above it in the region traversed by the temporal blood-vessel, for spasm seizes the patient. And if incision of the temple is made on the left, spasm seizes the parts on the right, while if the incision is on the right, spasm seizes the parts on the left.<sup>15</sup>

When you incise a head wound because the bone is denuded, and you want to know whether it has, or has not, suffered any injury



from the weapon, the size of the open wound should be such as seems fully sufficient. When operating you should detach the scalp from the skull where it is adherent to the membrane and to the bone. Then plug the whole wound with lint, so that next day it will present the widest possible lesion of continuity with least pain. When plugging use a plaster of dough from fine barley meal to be kept on as long as the lint. Knead it up with vinegar and boil, making it as glutinous as possible.\* Next day, when you take out the lint, if, on looking to see what the bone has suffered, the nature of the lesion is not clear, and you cannot even see whether the skull has anything wrong with it, yet the weapon seems to have reached and damaged the bone, you should scrape down into it with a raspatory, both up and down as regards the patient, and again transversely so as to get a view of latent fractures and contusion which is latent because the rest of the bone is not crushed in out of its natural position. For rasping shows up the mischief well, even if these lesions, though existing in the bone are not otherwise manifest.

If the skull lesion seems to be a case for trephining, you should operate and not leave the patient untrephined till after the three days, but trephine in this period, especially in the hot season, if you take on the treatment from the first.

### THE BLACK SOLUTION

Should you suspect the skull to be fractured or contused or both, judging from the patient's account that the blow was severe and inflicted by a stronger person—if he was struck by someone else—and that the instrument with which he was wounded was of a dangerous kind, further, that the man suffered vertigo and loss of sight, was stunned and fell down in such circumstances, if you cannot otherwise distinguish by inspection whether the skull is fractured or contused or even both, then you must drop on the bone the very black solution (*which we will call a PATHFINDER*), anoint the wound with the dissolved black drug, putting linen on it and moisten with oil, and then apply the barley-meal plaster and bandage. Next day, having opened and cleansed the wound, scrape further,

*\* This glutinous mass would not be adherent and could be removed with little discomfort to the patient.*

and, if it is not sound but fractured and contused, the rest of the bone will be white after scraping, but the fracture and contusion will have absorbed the dissolved drug and will be black in the white bone <sup>16</sup>

When the wound is cleansed it should get rather dry, for so it will soonest become healthy, the growing tissue being dry and not moist, and thus the wound will have no exuberance of flesh. The same principle applies to the dura covering the brain. For if you trephine at once and by taking away the bone denude this membrane, you should make it clean and dry as soon as possible, lest by being moist a long time it should fungate and swell up, for in such circumstances there is risk of its becoming putrid <sup>17</sup>

### NECROSIS OF THE BONE

When anyone is going to die from wounds in the head, and it is impossible to make him well or even save his life, the following are the signs from which one should make the diagnosis of approaching death and foretell what is going to happen. He has the following symptoms—when, after recognizing that the skull is injured, either broken or contused, or injured in some way, one makes a mistake and neither scrapes nor trephines as though it were not required, yet the bone is not sound, fever as a rule will seize the patient within fourteen days in winter, and in summer just after seven days. When this occurs, the lesion gets a bad colour and a little ichor flows from it, the inflammation dies completely out of it, it gets macerated and looks like a dried fish of a rather livid reddish colour. Necrosis of the bone then sets in, it gets dark coloured instead of white, finally turning yellowish or dead white. When it has become purulent, blebs appear on the tongue and the patient dies delirious. Most cases have spasm of the parts on one side of the body, if the patient has the lesion on the left side of the head, spasm seizes the right side of the body, if he has the lesion on the right side of the head, spasm seizes the left side of the body. Some also become apoplectic and die in this state <sup>18</sup>

### TREPHINING

When it is necessary to trephine a patient, keep the following in mind

If you operate after taking on the treatment from the beginning, you should not, in trephining, remove the bone at once down to the dura, for it is not good for the dura to be denuded of bone and exposed to morbid influences for a long time, or it may end by becoming macerated. There is also danger that, if you immediately remove the bone by trephining down to the dura, you may, in operating, wound it with the trephine. You should rather stop the operation when there is very little left to be sawn through, and the bone is movable, and allow it to separate of its own accord. For no harm will supervene in the trephined bone, or in the part left unsawn, since what remains is thin enough.

While trephining, you should frequently take out the saw and plunge it into cold water to avoid heating the bone, for the saw gets heated by rotation, and by heating and drying the bone cauterizes it and makes more of the bone around the trephined part come away than was going to do so.

If you do not take on the cure from the beginning, but receive it from another, coming late to the treatment, trephine the bone at once down to the dura with a sharp-toothed trephine, taking it out frequently for inspection, and also examining with a probe around the track of the saw. For the bone is much more quickly sawn through if you operate when it is already suppurating and full of pus, and the skull is often found to have no depth, especially if the wound happens to be in the part of the head where the bone inclines to be thin rather than thick. You must be careful not to be heedless in placing the trephine, but always to fix it where the bone seems thickest. Examine often, and try by to-and-fro movements to lift up the bone, and, after removing it, treat the rest as may seem beneficial to the lesion (having regard as to what has happened) <sup>19</sup>

*At this point Hippocrates' chief assistant hurriedly entered the amphitheater and whispered a few words to his chief. Hippocrates looked troubled, glanced up at the open sky for a moment, then faced his audience and said*

*Much to my regret, I shall not be able to demonstrate this patient with the head injury. He expired suddenly after a severe convulsion that lasted several minutes. After the lec-*

*time we shall examine the dead body because from the dead we know the living I shall very probably be able to demonstrate to you that the fatal convulsion was due to a hemorrhage between the bone and the dura*

*I am particularly distressed because I may have erred in my judgment in this case I should have trephined at once when I prepared the field yesterday* In treating dangerous conditions one must take certain risks With luck the patient may recover, if not the outcome can be but one that had been anticipated <sup>20</sup>

### EAR INFECTIONS

*Since we have been interested in the surgery of the head and have been discussing the glands, continued Hippocrates, I have asked Polybus to bring in a young boy, the son of Kydis, who became ill at the time of the winter solstice with fever and cough and chill and pain in the right side, with headache and ear trouble He had had a discharge of the ear since early childhood, it had ulcerated and there was a foul odor but the ear was practically always painless However, at the time of the solstice the pain in the ear was present, with an excruciating headache and fever On the second or third day he was nauseated and vomited, the stool was yellowish and tough and it contained yellow-green particles*



*Since that time he has been very sick—Polybus "the son of Kydis" will demonstrate the case to you Occasionally there has been foul discharge which you can readily smell when you examine the boy* <sup>21</sup>

*The patient was brought in and the students examined the boy, the while Hippocrates continued his discussion*

*I call your attention to the fact that this case began with the winter solstice* Most begin in the winter and spring, though exacerbations can, of course, occur at any time, most often with a change of weather, or after chilling or fatigue or with some other disease Often they

begin with the abundant flow of mucus from the head—sometimes the tonsils or other glands are inflamed

Excretion from the head reaching the ears and causing pain may continue until a fistula has been formed, then pain is no longer experienced. In such cases it is best to instill a warmed irritant dissolved in oil of bitter almonds and then to use a suction cup on the opposite side, but to make no incisions. If this does not stop the pain, it is best to use some cooling substances in the ear and give a cathartic. It is essential that if the first type of treatment is not beneficial then one should turn to the opposite, for the simple reason that if the first treatment makes the symptoms worse one should go over to the opposite. But if the patient improves, then it is best to let him alone.<sup>22</sup>

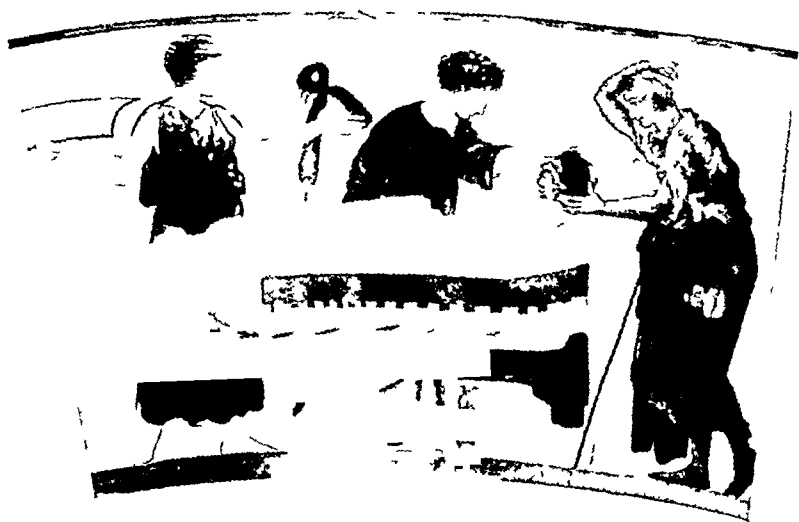
*Infection of the ear must immediately be recognized as an evil portent, because of possible brain involvement.* Severe pain in the ears with fever and any other sign of evil omen kills young people usually about the seventh day or earlier, with severe mental disturbance, provided that there is not a strong flow of pus from the ear or a flow of blood from the nose or some other useful sign. Older people are more resistant and die more rarely. If pus flows from the ear earlier, mental disturbance is less frequent. The patients, however, frequently have relapses and may then die.<sup>23</sup>



"the beautiful  
daughter of  
Nerios"

*Disturbances of the ear may, however, take origin as in the case of* the beautiful daughter of Nerios, who was twenty years old. While playing ball with a dear friend she was struck with the flat of the hand over the forehead. She immediately became blind and breathless. When she came home she developed a fever, headache and a marked erythema of the face. On the seventh day the right ear suppurated and about a cup of pus was discharged. After this she felt better. The fever, increased, however, she became comatose and remained silent, the right half of the face was distorted, she became short of breath and there were convulsions, tremors, heaviness of the tongue and paralysis of the eye. On the ninth day she died.<sup>24</sup>

*Infections may spread, as for instance, in the case of* the man who, after the setting of the Pleiades, complained of earache, lost his



*"On the ninth day she died"*

speech after twenty days and was not able to move the extremities of the right side. Without having a fever he perspired. It was the right ear that was diseased, the right eye could not be closed entirely and was pushed upward. He had a squint in the left eye with terrific pain, then the neck became stiff. About three hours later he began to complain bitterly.<sup>25</sup>

The ears have a tortuous and narrow passage and if the brain is involved in association with ear involvement, ultimately a foul-smelling purulent discharge may flow from the ear *as in the case you have before you*.<sup>26</sup>

*On the other hand, there may be ear symptoms of a totally different nature. So, for instance, pounding in the head with ringing of the ears may usher in vascular disturbance or is liable to cause increased menstrual flow, particularly if hot flashes pass down the spine (if vasomotor disturbances are perceived along the back).<sup>12</sup> One may have deafness, in patients who have tremor of the hands when they reach for something (intention tremor), with paralysis of the tongue and who are weak.<sup>28</sup>*



*"the right eye could not be closed entirely"*

Hardness of hearing may occur in any advanced illness when the urine is dark *red* without a precipitate or shows a flocculent precipitate that does not settle, with this there may be mental disturbance. If there is jaundice in addition, that is bad, particularly if there are sensory disturbances after the appearance of the jaundice. Sometimes such patients lose their speech without losing sensory feeling, and there may not infrequently be involvement of the gastrointestinal tract in addition.<sup>29</sup>

*This particular disease under discussion* takes place when the vessels of the brain are dilated. The arteries begin to pound and the head and ears are full of noise and one hears poorly. The ears ring because the small vessels are pounding, the individual hears badly because of the noise and the tumult in the interior of the ear because both the brain and the small vessels are dilated. Inasmuch as the air spaces in the ears are compromised and no longer give the same resonance, the capacity to hear is diminished.<sup>30</sup>

## HEADACHE

*Of course, such a symptom as headache may originate in a variety of ways and you* must consider the associated symptoms in order to arrive at proper treatment. When there is an associated inflammation, it is a rule that in all internal suppurations and particularly in eye (and ear) troubles, the symptoms are worse at night.<sup>31</sup>

*And* when you study the beginning of fever attacks, it becomes evident that all diseases are accentuated in this way.<sup>32</sup>

If the patient, who has fever that is not mortal, says that his head aches and that darkness appears before his eyes, should he also feel heartburn, a bilious vomiting will soon occur. If a rigor then supervene, and the parts below the hypochondrium are cold, the vomiting will occur sooner, and if the patient drinks something at this time he will vomit very soon indeed.<sup>33</sup>

Some patients with headache experience not darkness before the eyes but dimness of vision, they see flashes of light, while instead of heartburn, there may be tension of the right or left hypochondrium without pain or inflammation. In these cases we need not expect that they will vomit but they may bleed from the nose. Even in these cases, too, we may expect hemorrhages, especially in young people,

but it occurs less frequently if the patient be 30 years of age or more

*I have mentioned all these things* because even the good physician is puzzled by the similarity of diseases, and so, too, with the contrast of disease. He must determine the cause of the disease. How difficult it is, even for the experienced physician to know the right course of treatment! What is to be done, if the patient is a long head, has a flat nose (*if he is a pyknic*), if he is of dry constitution or biliary constitution, if it is difficult to make him vomit or if he is of melancholic disposition, if he is young in years or has lived a frivolous life? It is difficult to encompass all this and to make it rhyme with orderly therapeutic precepts <sup>34</sup>



"Discussion"



# In the Surgery—III

## *Fractures and Dislocations*



### *Synopsis*

*CRUSHING INJURY Proper damage Fracture of the arm Theory vs Practice Dislocation The "heel in shoulder" method and the "shoulder lift" The causes of dislocation Emaciated cattle*

*Fractures of the vertebrae An experiment in extension Cord injuries and the symptoms Muscle coordination and antagonism Atrophy The maintenance of proper function Massage Exercise Persistent treatment in the hopeless cases Management Anticipation Uncertainty of outcome Lockjaw*

### TRAUMA

*The patient who lies before you in extremis is a man of Malis, who suffered severe injury to his chest when a heavily laden wagon ran over him. Several ribs were broken. Some time after this pus was discharged from below the ribs. He was cauterized around the region of the spleen and a woolen drain was inserted into the tract. About ten months later, the skin was incised and a large cavity was revealed to the surgeon, this extended to the omentum and the foul focus penetrated through to the region of the kidney and actually all the way to the bone.*

The attending surgeons had not noticed that his constitution was biliary (*toxic*) and that the tissues were septic, particularly the omentum was gangrenous as well as some of the other adjacent

parts If at all possible, all of this tissue should have been cleared at once with dehydrating agents, while the patient still had some resistance The tissue fluids were of no avail because they were immediately infected Nor did the drain do any good, it merely blocked proper drainage<sup>1</sup> The abundant gangrenous and foul smelling exudate continued and the patient developed chills and fever It was finally realized that the focus was much deeper than had been suspected and he was sent here But though the patient has, by good fortune, survived all the remedial measures of his surgeons, his recovery has now become impossible because a terminal diarrhea has developed He will die<sup>1</sup>

*Recently I saw a patient* in Oineiadaí, Eupolemos by name, who had severe pain in the right hip and femur, in the inguinal region and in the anterior portion over the hip, he had been bled at the ankle and purged He felt somewhat better but the pain continued and in addition to that, suppuration began about the hip and in the inguinal region, in the course of time the pain increased Apparently the suppuration was from the bone rather than from the superficial tissues but because the lesion was so deep, this was not evident until the patient had become pretty well weakened Then the wound was thoroughly cauterized and much thick pus exuded, however, he died a few days later One can draw the lesson that if a proper incision had been made early enough to provide proper drainage the patient might have recovered<sup>2</sup>

One should keep in mind that caries of the bone is painful, the bone becomes thin, distended at certain parts, and fractures easily When one makes an incision one finds that the bone itself is bloodless, roughened, reddish brown, in the case of the skull it may penetrate through to the brain In cases of this sort it is best, if the bone has been ulcerated through and through, to remove it entirely in order to heal the wound as rapidly as possible If, however, the bone has not been completely ulcerated but is only rough then, in the case of the skull, one scrapes the bone as far as the diploeæ<sup>3</sup>

#### FRACTURE OF THE ARM

*Inasmuch as we discussed fractures of the skull yesterday, I need not return to the subject, but shall turn to fractures of the arm,*

*because it is a field in which* the theorizing practitioners are just the ones who go wrong. In fact the treatment of a fractured arm is not difficult, and is almost any practitioner's job, but I have to talk a good deal about it because I know practitioners who have received credit for wisdom by putting up arms in positions which ought rather to have given them a name for ignorance. And many other parts of this art are judged thus for they praise what seems outlandish before they know whether it is good, rather than the customary which they already know to be good, the bizarre rather than the obvious. One must mention these errors of practitioners as to the nature of the arm on which I want to give positive and negative instruction, for this discourse is an instruction on other bones of the body as well.<sup>4</sup>



To come to our subject a patient presented his arm to be dressed in the attitude of pronation, but the practitioner made him hold it as the archers do when they bring forward the shoulder, and he put it up in this posture, persuading himself that this was its natural position. He adduced as evidence the parallelism of the forearm bones, and the surface also, how that it has its outer and inner parts in a direct line, declaring this to be the natural disposition of the flesh and tendons, and he brought in the art of the archer as evidence. This gave an appearance of wisdom to his discourse and practice, but he had forgotten the other arts and all those things which are executed by strength or artifice, not knowing that the natural position varies in one and another, and that in doing the same work it may be that the right arm has one natural position and the left another. For there is one natural position in throwing the javelin, another in using the sling, another in casting a stone, another in boxing, and another in repose. How many arts might one find in which the natural position of the arms is not the same, but they assume pos-

tures in accordance with the apparatus each man uses and the work he wants to accomplish<sup>1</sup> As to the practicer of archery, he naturally finds the above posture strongest for one arm for the hinge-like end of the humerus in this position being pressed into the cavity of the ulna makes a straight line of the bones of the upper arm and forearm, as if the whole were one, and the flexure of the joint is extended (abolished) in this attitude Naturally then the part is thus most inflexible and tense, so as neither to be overcome or give way when the cord is drawn by the right hand And thus he will make the longest pull, and shoot with the greatest force and frequency, for shafts launched in this way fly strongly, swiftly and far But there is nothing in common between putting up fractures and archery For, first, if the operator, after putting up an arm, kept it in this position, he would inflict much additional pain—greater than that of the injury, and again, if he bade him bend the elbow, neither bones, tendons, nor flesh would keep in the same position, but would rearrange themselves in spite of the dressings Where, then, is the advantage of the archer position? And perhaps our theorizer would not have committed this error if he had let the patient himself present the arm<sup>5</sup>

### DISLOCATION

As to the shoulder joint, I know only one dislocation, that into the armpit I have never observed either the upward or outward form, but do not wish for my part to be positive as to whether such dislocations occur or not, though I can say something on the subject Nor have I ever seen anything that seemed to me a dislocation forwards Practitioners, indeed, think forward dislocation often happens, and they are especially deceived in cases where there is wasting of the flesh about the joint and arm, for in all such the head of the humerus has an obvious projection forwards In such a case I myself once got into disrepute both with practitioners and the public by denying that this appearance was a dislocation I seemed to them to be the only person ignorant of what the other recognized and found it hardly possible to make them understand that the case was as follows Suppose one laid bare the point of the shoulder of the fleshy parts of the arm, and also denuded it at the part where the deltoid is attached and laid bare the tendon stretching along the armpit and collarbone

to the chest, the head of the humerus would be seen to have a strongly marked projection forwards, though not dislocated. For the head of the humerus is naturally inclined forwards, while the rest of the bone is curved outwards. The humerus, when extended along the ribs, meets the cavity of the shoulder blade obliquely, but when the whole arm is extended to the front, then the head of the humerus comes in line with the cavity of the shoulder-blade and no longer appears to project forward. To return to our subject, I never saw a dislocation forwards but do not want to be positive about this either, whether such dislocation occurs or not. When, then, the humerus is displaced into the axilla, many know how to reduce it since it is a common accident, but expertness includes knowledge of all the methods by which the practitioners effect reduction and the best way of using these methods. You should use the most powerful one when you see the strongest need, and the method that will be described last is the most powerful.

### REDUCTION

Those who have frequent dislocations of the shoulder are usually able to put it in by themselves. For by inserting the fist of the other hand into the armpit they forcibly push up the head of the bone, while they draw the elbow to the chest. And a practitioner would reduce it in the same way if, after putting his fingers into the armpit inside the head of the dislocated bone, he should force it away from the ribs, thrusting his head against the top of the shoulder to get a point of resistance, and with his knees thrusting against the arm at the elbow, should make counterpressure towards the ribs—it is well for the operator to have strong hands—or, while he uses his hands and head in this way, an assistant might draw the elbow to the chest.

Those who attempt to put in the shoulder with the heel, operate in a way nearly conformable with nature. The patient should lie on his back on the ground, and the operator should sit on the ground on whatever side the joint is dislocated. Then grasping the injured arm with both hands he should make extension and exert counterpressure by putting the heel in the armpit, using the right heel for the right armpit and the left for the left. In the hollow of the armpit

one should put something round fitted to it, the very small and hard balls such as are commonly sewn up from bits of leather are most suitable. For, unless something of the kind is inserted, the heel cannot reach the head of the humerus, for when extension is made on the arm the axilla becomes hollow and the tendons on either side of it form an obstacle by their contraction. Someone should be seated on the other side of the patient undergoing extension to fix the sound shoulder so that the body is not drawn round when the injured arm is pulled the other way.

Take, besides, a fairly broad strap of soft leather, and after the ball is put into the armpit, the strap being put around and fixing it, someone, seated at the head of the patient undergoing traction, should make counterextension by holding the ends of the strap, and pressing his foot against the top of the shoulder blade. The ball should be put as far into the armpit and as near the ribs as is possible, not under the head of the humerus.

### SHOULDER LIFT

There is another mode of reduction in which they put it right by a shoulder lift, but he who does the shoulder lift must be the taller. Grasping the patient's arm, let the operator put the point of his own shoulder under his armpit, then make a turn that it may get seated there—the aim of the maneuver being to suspend the patient from his shoulder by the armpit. He should hold this shoulder higher than the other, and press in the arm of the suspended patient as far as possible toward his own chest. In this attitude let him proceed to shake the patient when he lifts him up, so that the rest of the body may act as a counterpoise to the arm which is held down. If the patient is very light, a boy of small weight should be suspended to him from behind. All these methods are very useful in the palæstra, since they do not require further bringing in of apparatus, and one might also use them elsewhere.<sup>6</sup>

*Hippocrates then described several other methods and finally suggested that one should always make use of what happens to be at hand—being a very practical physician.<sup>7</sup>*

## CAUSES

*Then followed the query, why? Why the dislocation?*

One should bear in mind that there are great natural diversities as to the easy reduction of dislocations. There may be some differences in the sockets, one having a rim easy to cross, the other one less so,



but the greatest diversity is the attachment of the ligaments, which in some cases is yielding, in others constricted. For the humidity in individuals as regards the joints comes from the disposition of the ligaments which may be slack by nature and easily lend themselves to extensions. In fact one may see many persons of so humid a temperament that when they choose they can dislocate and reduce their joints without pain. The state of the body makes a further difference, for in those who are muscular and have the limb in good condition, dislocation is rarer and reduction more difficult, but when they are thinner and less muscular then usually dislocation is more frequent and reduction easier. The following also shows that this is so.

In the case of cattle the thigh bones get dislocated from the socket when they are at their thinnest. Now cattle are thinnest at the end of winter and it is then especially that they have dislocations, if indeed such a matter should be mentioned in a medical class.

And it should be, for Homer has well observed that of all the farm beasts, cattle suffer most during this season, and among cattle the plowing oxen because they work in the winter. It is in these, then, that dislocation especially occurs, for they are especially attenuated. For other farm animals can graze on herbage while short, but cattle can hardly do so until it is long, since in the others the projection of the lip is thin, as is also the upper jaw, but in the ox the projection of the lip is thick and the upper jaw thick and blunt, wherefore he cannot grasp the short herbage. But the solid-hoofed animals, having a double row of teeth cannot only browse but can also grasp the short

herbage with their teeth, and they prefer this kind to the long grass. In fact, the short grass is on the whole better and of more substance than the long, especially when the long is just going to seed. It is in allusion to this that he wrote the following verse "AS WHEN THE SEASON OF SPRING ARRIVES, WELCOME TO CRUMPLE-HORNED CATTLE," because the long grass appears most welcome to them.

Moreover in the ox this joint is generally more lax than in other animals, and for this reason it has a more shambling gait than other animals, especially when it is thin and old. For all of these reasons the joint is especially liable to dislocation in the ox and more has been written about it because these facts testify to all the preceding statements.

To return to the subject, dislocation occurs more easily and is more quickly reduced in emaciated than in muscular persons, and inflammation more readily supervenes in the moist and thin than in muscular subjects of a dry habit, but the joint is not so firm afterwards. Further, if an excess of mucus substance is engendered without inflammation, this too will make it more liable to slip, and on the whole, the joints of emaciated persons contain more mucus than those of muscular persons. One sees, in fact, that these tissues in emaciated persons, who have not been normally reduced according to these principles of the art, have more mucosity than those of stout people. But in those in whom mucus develops along with inflammation, the inflammation keeps the joints firm. This is why the joints do not often get dislocated from a slight excess of mucus, though they would do so were there not more or less inflammation at the bottom of it.<sup>8</sup>

### THE VERTEBRAE

*By contrast he then described how difficult it is to dislocate or fracture the vertebrae.* From behind it would not be easy for such sudden luxation to take place inwards, unless some very heavy weight fell on the spine, for each of the external bony epiphyses is of such a nature as to be fractured itself before overcoming the ligaments and interconnecting joints and make a great deviation inwards. The spinal cord, too, would suffer, if the luxation due to jerking out of a vertebra had made so sharp a curve, and the vertebra in springing out would press on the cord, even if it did not break it. The cord, then,



being compressed and intercepted, would produce complete narcosis of many large and important parts, so that the physician would not have to trouble about how to adjust the vertebra, in the presence of many other urgent complications. So, then, the impossibility of reducing such a dislocation either by compression or any other method is obvious, unless after cutting open the patient, one inserted the hand into the body cavity and made pressure from within outwards. One might do this with a corpse but hardly with a living patient.<sup>9</sup>

Curvature of the spine occurs even in healthy persons in many ways, for such a condition is connected with its nature and use, and besides, there is giving way at old age, and account of pain. But the outward curvatures due to falls usually occur when the patient comes down on his buttocks or falls on his shoulders, and in the curvature, one of the vertebrae necessarily appears to stand out more prominently, and those on either side less so. It is not that one has sprung out to a distance from the rest, but each gives way a little and the displacement taken all together seems great. This is why the spinal marrow does not suffer from such distortion, because the distortion affecting it is curved and not angular.

#### AN EXPERIMENT

*Hippocrates discussed extension of the spine and continued.* For my part, then, I know no better or more correct modes of reduction than these. For straight line extension on the spine itself, from below, at the sacrum gets no grip, from above, at the neck and head, it gets a grip indeed, but extension made here looks unseemly and would also cause harm if carried to excess. I once tried to make extension with the patient on his back, and after putting an unblown-up bag under the hump, then tried to blow air into the bag with a bronze tube. But my attempt was not a success, for when I got the man well stretched, the bag collapsed, and the air could not be forced into it, it also kept slipping around at any attempt to bring the patient's hump and the convexity of the blown-up bag forcibly together, while when I made no great extension of the patient, but got the bag well blown up, the man's back was hollowed as a whole rather than where it should have been. I relate this on purpose, for

these things also give good instruction which after trial show themselves failures, and show why they failed <sup>10</sup>

### CORD DAMAGE

In cases where the vertebrae are curved inwards from a fall or the impact of some heavy weight, no single vertebra is much displaced from the others as a rule, and if there is great displacement of one or more, it brings death. But, as I said before, this dislocation also is in the form of a curve and not angular. In such cases, then, retention of urine and feces is more frequent than in outward curvatures. The feet and the lower limbs as a whole more usually lose heat and these injuries are more generally fatal. Even if they do survive they are more liable to incontinence of urine, and have more weakness and torpor of the legs, while if the incurvation occurs higher up they have loss of power and complete torpor of the whole body. For my part, I know of no method for reducing such an injury, unless succussion on the ladder may possibly be of use, or such other extension treatment as was described a little above.

I might mention other modes of extension besides those related above, which would appear more suitable to the lesion, but I have no great faith in them, and therefore do not describe them. In fact, many more patients get paralysis of legs and arms, loss of sensation in the body and retention of urine when there is no displacement either inwards or outwards, but a severe concussion in the line of the backbone, while those who have a hump displacement are less liable to such affections <sup>11</sup>

### MUSCLE TONE

*Naturally the physician reducing dislocation and setting fractured bones becomes very conscious of muscular coordinations and antagonisms, and so Hippocrates discusses the problem.* One should also bear the following in mind—it is a useful and important matter, of which most are ignorant—that not even sound individuals can extend the joint at the ham, if they do not extend that of the groin as well, unless they lift the foot very high, then they could do it. Nor can they as readily flex the joint at the ham, unless they flex that at the groin as well, but only with much greater difficulty. Many parts of the

body have affinities of this kind, both as regards contraction of cords and attitudes of muscles, and they are very numerous and more important to recognize than one would think, both as regards the intestine and the whole body cavity, also the irregular movements and contractions of the uterus. But these matters will be discussed elsewhere.

### MANAGEMENT IN THE CHRONIC CASE

*In discussing the careful treatment of the muscles and of the limbs after fractures, dislocations, etc., he stated that* wasting of the flesh takes place in these cases also according to rule, as said before, in those who keep the leg off the ground and give it no exercise the wasting is greatest, while in those who use it most in walking it is least. Still, the sound leg gets no benefit, but rather becomes also somewhat deformed if patients use the injured leg on the ground, for in giving assistance to the latter, it is forced outward at the hip, and bends at the ham, but if one does not use the injured leg on the ground as well, but keeping it suspended, gets support from a crutch, the sound limb thus becomes strong, for it is employed in the natural way and the exercises strengthen it more. One might say that such matters are outside the healing art. Why forsooth trouble one's mind further about cases which have become incurable? This is far from the right attitude. The investigation of these matters too belongs to the same science, it is impossible to separate them from one another. In curable cases we must contrive ways to prevent their becoming incurable, studying the best means for hindering their advance to incurability, while one must study incurable cases so as to avoid doing harm by useless efforts. Brilliant and effective forecasts are made by distinguishing the way, manner and time in which each case will end, whether it takes a turn to recovery or to incurability. In cases where such a dislocation backwards occurs and is not reduced, whether congenitally or during the period of growth, and whether the displacement is due to violence or disease—many such dislocations occur in diseases and the diseases which cause such dislocations will be described later—if, then, the displacement is unreduced, the thigh bone gets short, and the whole leg deteriorates, and becomes much more undeveloped and devoid of flesh, because it gets no exercise.

Speaking generally, all parts of the body which have a function, if used in moderation and exercised in labors to which each is accustomed, become thereby healthy and well developed, and age slowly but if unused and left idle, they become liable to disease, defective in growth and age quickly. This is especially the case with joints and ligaments, if one does not use them<sup>12</sup>

*This has been a long demonstration, said Hippocrates, I have tried to make this very important subject as simple as I can. You must know your anatomy—and you must know the three cardinal principles wherewith you can apply power (i.e., the lever, the wedge, the wheel, etc.) if you wish to achieve proper results in dislocations and fractures, because only on such a foundation can you be successful.*

*You must know what to do, how to do, when to do, and when not to do things. Even the latter is most important. So, for instance, a fractured ear is far from needing splints and bandaging. If need be, the best application is a glutinous flour paste, even this should not be too heavy. It is well to touch the part as little as possible, for it is a good remedy sometimes to use nothing, both in the case of the ear and many others<sup>13</sup>*

*And now for a little fatherly advice*

### ANTICIPATION

You must practice these things in medicine with all reserve, in the matter of palpation, anointing, washing, to ensure elegance in moving the hands, in the matter of lint, compresses, bandages, ventilation, purges, for wounds and eye troubles, and with regard to the various kinds of these things, in order that you may have ready beforehand instruments, appliances, knives, etc. For lack of these matters means helplessness and harm. See to it that you have a second physician's case of simpler make, that you may carry in your hands when on a journey. The most convenient is one methodically arranged, for the physician cannot possibly go through everything.

When you enter a sick man's room, having made these arrangements, that you may not be at a loss, and having everything in order

for what is to be done, know what you must do before going in. For many cases need, not reasoning but practical help. So you must from your experience forecast what the issue will be. To do so adds to one's reputation and the learning thereof is easy.<sup>14</sup>

### UNCERTAINTY—TETANUS (LOCKJAW)

*In surgery, unfortunately, our forecasts cannot always be certain, for surgical intervention is occasionally followed by convulsions*

*In Larissa, for instance, I attended Scamander whose hip was infected by gangrene and the bone sequestered after a long time. A large incision was made down to the bone and a cautery was applied. On the twelfth day after the incision was made, increasing spasms set in. The leg was drawn up to the ribs and the spasm passed over to the other side. The leg was flexed and extended, it set in motion the other parts. The jaws were fixed. The man died in a state of convulsion on the eighth day after the onset of the spasm. He was treated over the whole body with fomentations, applied by means of leather bags, and with embrocations made of lentils. An enema was administered, which yielded a small amount of old feces. He drank the dark purgative, which evacuated something, but obtained no help from the medicine. He slept little, and toward evening drank again the potent dark purgative, he died at sunrise. It seems that he would have lasted a longer time had it not been for the strength of the purgative.<sup>15</sup>*

*When the patient has tetanus following a wound, the patient shows the following symptoms: the jaw muscles become hard as wood, the patient cannot open his mouth at all, there is lachrymation, the eyes are distorted, the back becomes stiff, the patient can bend neither the legs, hands, nor spine. The outcome is always fatal and unfortunately we have no remedy.<sup>16</sup>*

*Now we turn from the fifth century B.C. to the most recent study of Chalian,<sup>17</sup> AN ESSAY ON THE HISTORY OF LOCKJAW, who states that "the excellent descriptions found in the Hippocratic treatises are so accurate that they can scarcely be amended today. A fresh*

*'the Hippocratic casuistics of tetanus and ideas concerning its*

*etiology, treatment and prognosis, rewards us with findings that are truly exciting, particularly since the true significance of some of them appears not to have been grasped before. It is in the works of Hippocrates that the nomenclature of tetanus is first encountered."*

*Chalban adds that "the 'Oracle of Cos' and his followers were keen enough to recognize some of the atypical forms of tetanus*

*"The aggravation of symptoms when the patient gets up and walks about in this modified form of the disease is well described. At first the patient walks about, then as the disease progresses he takes to his bed. The suffering and spasm abate. Then perhaps he may get up again and walk for several days, when he will find himself in the same difficulties. The exacerbating influence of physical exercise upon the manifestations of incipient tetanus was not described again until the nineteenth century.*

*"One can almost say that practically nothing of importance was added to the teaching of the Hippocratic school with regard to tetanus, until Carle and Rattone in the year 1884 proved the infectious nature of the disease by inoculating rabbits with pus taken from a furuncle on the face of a patient that died of tetanus. Our judgment respecting the merits of the Greek physicians and their successors can only be based upon purely objective data which they supplied and not upon their ideas of the etiology of the disease, or even its treatment for only that which they truly perceived with the five senses and committed to writing is of lasting value. In the case of tetanus their observations square with those made today."*

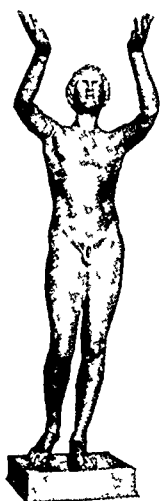


## CHAPTER XI

# Theory—I

## The Cosmic Concept

### Synopsis



*The Sun  
Worshiper*

*EVOLUTION* Heracleitus and Democritus The sun and fire An energy concept Water, a concept of matter Transition earth—water—soul Fire (energy) and water (matter) make up the universe The law of the conservation of matter Motion—"the road up and the road down" The fourth dimension—time The rotation of the earth Organic application—(1) the unstable organic equilibrium (2) maciocosmos and microcosmos Balance of fire and water The disturbance of equilibrium—disease Effort of total organism to restore disturbed balance *Vis medicatrix naturae* Empiricism The individual in the framework of law and rule

NOTES—Democritus *Periods of Greek Advance in Natural Philosophy* The Evolutionists Julius Robert Mayer—the Law of the Conservation of Energy Harmony, Music, and Organic Rhythm

### THE COSMIC CONCEPT

Greek medical theory, the reader may say, need not detain us, it could not have had a sound basis because of the absolute lack of all the instruments that have enabled modern medical science to reach its pinnacle of achievement

Yes and No! We have already found that the recognition of anoxia was definitely based on careful observations and proper deductions The deductions so derived are valid today, indeed, are just coming into vogue today!

*What did the Greek philosophers, particularly the Ionian School, think of the world, of the cosmos, of man, of the*

*organic world? Hippocrates' ideas would reflect then views, for he was a contemporary and intimate associate of Democritus and thoroughly acquainted with the writings of the older school [Notes A, B, and C]*

*The Greeks were evolutionists and Hippocrates considered man as having evolved by the selection of survival types. Says he: I am of the opinion that to begin with men used this sort of nourishment, satisfied with the same food and drink as satisfy an ox, a horse and every other animal. Our present ways of living have, I think, been discovered and elaborated during a long period of time. For many and terrible were the sufferings of men from strong and brutish living when they partook of crude foods, uncompounded and possessing great powers—the same, in fact, as men would suffer at the present day, falling into violent pains and diseases quickly followed by death. While indeed they probably suffered less, because they were used to it, but they suffered severely even then. The majority naturally perished, having too weak a constitution, while the stronger resisted longer, just as at the present time some men easily deal with strong foods, while others do so only with many severe pains.<sup>1</sup>*

*Hippocrates was naturally interested in the unknown and mysterious forces of nature, but he considered the unknown as territory to be explored and examined, the mysterious, not as the mystic, but as the scientist who regarded religion with tolerance\* and accepted the dominance of religion over the mind of common man, as we would today, the while he would agree with Heraclitus that God is day and night, winter and summer, war and peace, surfeit and hunger. But he undergoes transformations, just as fire when it is mixed with spices is named after the savor of each. And from this broad concept, the following implication: namely, that the wisest of men, compared with God, will appear as an ape in wisdom, in beauty, and in everything else.<sup>3</sup>*

But as to these images, they pray as if they were to talk to one's

\* It is godhead that purifies, sanctifies and cleanses us from the greatest and most impious of our sins, and we ourselves fix boundaries to the precincts of the gods, so that nobody may cross them unless he be pure, and when we enter we sprinkle ourselves, not as defiling ourselves thereby but to wash away any pollution we may have already contracted. Such is my opinion about purification.



house, knowing not the nature of gods and heroes, for the mysteries that are celebrated among men, it is unholy to take part in <sup>4</sup>

*If we are to examine the Hippocratic concept we must revise our definition of certain word symbols that they may more nearly conform to the usage of the Greeks at the time of Hippocrates. Unless we do so, we shall be repelled by the confusion entailed. Nor must we limit this reorientation to the word symbols. We must accept a simple and direct personal relation to the environmental forces—strip off many of the interposed mental and physical mechanisms of the modern world.*

### THE SUN

*The Greek accepted the sun as the source of all energy, the sun was hot, was everlasting fire. The fire differed from that we knew on earth. Our fire depended on an supply. The fire of the sun, on the other hand, could not be of this type, for the fire was everlasting. Hippocrates suggested that the solar atmosphere must be very poor in air!*

*The Greeks accepted different kinds of heat or fire*

- (a) radiant, which could be of two types—the obvious heat of the sun or that of our fire,
- (b) heat that was due to work (friction),
- (c) heat due to organic action, i.e., was associated with energy exchange in the body, and
- (d) the hottest and strongest (ethereal) fire which controls all things, ordering all things according to nature, imperceptible to sight or touch. This governs all things always, both here and there (in the universe) and is never at rest <sup>5</sup>

*The concept of this hottest and strongest ethereal fire, which controls all things is, to all intents and purposes, the formulation of a modern energy concept, namely, the transmission of energy in wave motion. Until recently considered as immaterial, it is now accepted as involving the transmission of matter, in a form that has weight.*

### WATER

*This amazing Hippocratic prescience anticipated our modern definition of energy, not only by recognizing transmission imperceptible*

to sight or touch but as having a material basis, for to the Greeks the term water<sup>6</sup> symbolized matter, by contrast to fire, which was energy [On occasion, fire (energy) by contrast to water (matter) was used as equivalent to our catabolism vs anabolism]

According to Hippocrates, this rarest fire was associated with finest water<sup>1</sup> Matter transmitted as content of this energy<sup>1</sup>

These elements have severally the following attributes Fire has the hot and the dry, water the cold and the moist Mutually, too, fire has the moist from water, for in fire there is moisture<sup>7</sup>

Just as Lennox and Cobb a few years ago wrote that we had finally caught up with the Hippocratic understanding of epilepsy, we must suggest that we now meet Hippocrates on an equal footing in theoretical physics<sup>1</sup> We accept energy as wave motion that transmits matter—Hippocrates said fire (energy) imperceptible to sight or touch, that contains water (matter)<sup>1</sup>

We shall use the terms with acceptance of the implication that Hippocrates had anticipated our modern observations, achieved by the most delicate of instruments

If we now keep in mind the concept of rarest fire (energy transmitted in wave motion) which can alter water (matter), these two (fire and water) can separate off from themselves many forms of many kinds, both of seeds and of living creatures which are like to one another neither in their appearance nor in their power

For as they never stay in the same condition but are always changing to this or to that, from these elements too are separated off things which are necessarily unlike<sup>8</sup>

## THE CONSERVATION OF MATTER

It is important to keep in mind that nothing perishes and nothing comes into being that did not exist before<sup>8</sup>

Hippocrates might have added This is the law of the conservation of matter<sup>1</sup> A later physician added the law of the conservation of energy [Note D]

Things change merely by mingling and by being separated<sup>8</sup> In modern times we would say, chemical and physical, nuclear and atomic, molecular and colloidal change<sup>1</sup>

Everything is in motion, nothing perishes, but all things change<sup>1</sup>

This world which is the same for all, was made neither by God nor man, it ever was and is, and shall be, ever-living Fire, in measures being kindled and in measures going out<sup>9</sup> and, *Heracleitus added the road up and the road down is one and the same*<sup>10</sup>

*Which now brings up the factor of time and this, in the Heracleitean sense, is again related to the sun*

### TIME

So time, having a necessary connection and union with the firmament, is not motion merely, but, as I have said, motion in an order having measure, limits and periods Of which the sun, being overseer and warder, to determine, judge, appoint and declare the changes and seasons, which according to Heracleitus, brings all things, is a helper of the leader and first God, not in trivial of small things, but in the greatest and most important<sup>11</sup>

*Hippocrates accepted the concept of the continuous change in state—of becoming, i.e., a wholly dynamic concept, rather than the static state of being From this came the recognition of the fluidity of organic processes*

### THE ROTATION OF THE EARTH

Now the common man thinks that things come and go, appear and disappear as though coming suddenly into being from darkness (*the unknown*) while others diminish and perish from the known into the unknown (*Hades*) For they trust eyes, rather than mind, though these are not competent to judge even things that are seen But I use mind to expound thus What is not cannot come into being For whence will it come? But all things increase and diminish to the greatest possible maximum and the least possible minimum

Now, all things, both human and divine are in a state of flux upwards and downwards by exchanges Day and night, to the maximum and the minimum, just as the moon has its maximum and minimum, the ascendancy of fire and of water (*summer and winter*), so the sun has its longest and its shortest course—all the same things and not the same things Light for Zeus, darkness for Hades, light for Hades, darkness for Zeus—the things of the other world come to this, those of this world go to that, and during every season through-

out every place the things of the other world do the work of this, and those of this world do the work of that. And what men work they know not, and what they work not they think that they know, and what they see they do not understand, but nevertheless all things take place for them through a divine necessity, both what they wish and what they do not wish. And as the things of the other world come to this and those of this world go to that, they combine with one another, and each fulfills its allotted destiny, both unto the greater and unto the less. And destruction comes to all things from one another mutually, to the greater from the less, and to the less from the greater, and the greater increases from the smaller, and the smaller from the greater.<sup>12</sup>

*In modern terms we would simply say that when it is mid-day in Athens, it is mid-night in Honolulu, the things and activities now being carried on in the phase of Hades (Honolulu) will come to this world in (the phase of) Zeus, for as the world turns on its axis, the things of the other world (at the moment in the phase of Hades) come to our world (in the phase of Zeus), everything combines to make up one whole.*

But, said Hippocrates, when I speak of "becoming" or "perishing" I am merely using popular expressions, what I really mean is "mingling" and "separating." The facts are these "Becoming" and "perishing" are the same thing, "mixture" and "separation" are the same thing, "increase" and "diminution" are the same thing, "becoming" and "mixture" are the same thing, "perishing," "diminution" and "separation" are the same thing, and so is the relation of the individual to all things, and that of all things to the individual.<sup>13</sup>

*Hippocrates, apparently with this in mind, said that men do not understand how to observe the invisible through the visible. For though the arts they employ are like the nature of man, yet they know it not. For the mind of the gods taught them to copy their own functions,\* and though they know what they are doing yet they know not what they are copying. For all things are like, though unlike, all compatible though incompatible, conversing though not conversing, intelligent without intelligence. The fashion of each is contrary, though in agreement. For custom and nature, by means of which we*

*The microcosmos as modeled on the macrocosmos*

accomplish all things, do not agree though they do agree For custom was settled by men for themselves without their knowing those things about which they settled their custom, but the nature of all things are arranged by the gods Now that which men arranged never remains constant, whether right or wrong, but whatsoever things were arranged by the gods always remain right So great the difference between the right and the wrong <sup>14</sup>

## THE CLINICAL APPLICATION AND USEFULNESS

*The foregoing brief description of the Greek point of view as portrayed in REGIMEN, the NATURE OF MAN, etc., must not leave the impression that Hippocrates was primarily interested in the philosophical debates of the time*

*Hippocrates was not greatly interested in theory He forever was hewing to the line He who is accustomed to hear speakers (the public debaters) discuss the nature of man beyond its relation to medicine will not find the present account of any interest This is plain enough For, says he, I do not say at all that man is air or fire or water or earth (These were purely word symbols to Hippocrates!) or anything else that is not an obvious constituent of a man Even my medical colleagues fall into the same error and some say that man is blood, or bile or phlegm—no, in the body are many constituents, which by heating, by cooling, by drying or wetting one another contrary to nature, engender diseases (biochemical and biophysical disturbances) so that both the forms of diseases are many and the healing of them manifold <sup>15</sup>*

*One can observe considerable resistance to any speculative departure He is the matter-of-fact clinician who wants to be sure of his ground and his ground was clinical observation*

*He may have become interested in the mystery of numbers as a heritage from the Pythagorean School, or in the control of the elements because of familiarity with the teaching of the followers of Thales, but most likely his stay in Abdera with Democritus, and possibly a contact with Heraclitus inspired him more than any of the other contemporary or preceding groups*

## THE UNSTABLE ORGANIC EQUILIBRIUM

*Two concepts were most useful in his clinical thinking*

(1) *First, the assumption of life as involving the maintenance of an unstable balance between opposites, normal life, an attunement or harmony of many component dynamic rhythms (musical tones as an analogy) [Note E]*

(2) *Second, the analogy of the macrocosmos and the microcosmos, with its implication that the natural laws that govern the macrocosmos also govern the microcosmos, which in turn led to the first dictum which prefaces this commentary, namely, that he who would study medicine should first study meteorology!*

*We shall first discuss the Hippocratic thesis of the continuously fluctuating balance of all organic forces, in interaction with all environmental effectors. No scientist would today question its general validity, but as Henderson pointed out, "it presents a view of the physiological system in a state of equilibrium, without giving a satisfactory picture of the constituent parts of the system or of the forces that operate between these parts"*

Now all animals, including man, are composed of two things, different in power but working together in their use, namely, fire and water, (*energy plus matter, or functionally, catabolism vs anabolism*) Both together these are sufficient for one another and for everything else, but each by itself suffices neither for itself nor for anything else. Now the power that each of them possesses is this. Fire can move all things always, while water can nourish all things always, but in turn each masters or is mastered to the greatest maximum or the least minimum possible. Neither of them can gain the complete mastery for the following reason. The fire (*energy, catabolism*), as it advances to the limit of the water, lacks nourishment, and so turns to where it is likely to be nourished (*see lettering of Fig 1a*) (B-D), the water, as it advances to the limit of the fire, finds its motions fail, and so stops at this point (C)

When it stops its force ceases, and hereafter is consumed to nourish the fire which assails it (*catabolism exhausts the accumulated energy reserves*) Neither, however, can become completely master for the following reason. If ever either were to be mastered first, none of the things that are now would be as it is now (E). But things

being as they are, the same things will exist, and neither singly nor all together will the elements fail. So fire and water (*energy and matter, catabolism and anabolism*), as I have said, suffice for all things throughout the universe unto their maximum and the minimum alike.<sup>16</sup>

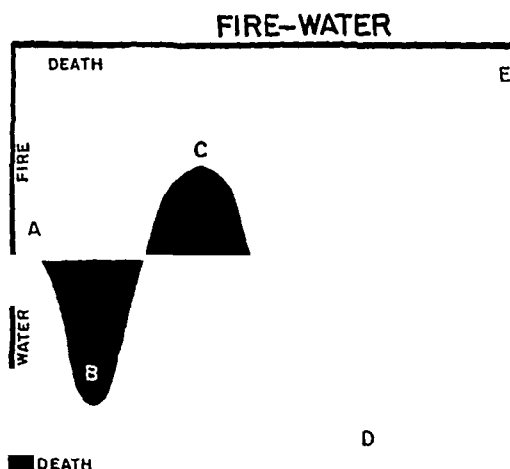


Fig. 1a The Unstable Organic Equilibrium in Hippocratic Terms of Fire (Energy) and Water (Matter)

I have put this in the form of a diagram (Fig. 1a). At the point A, fire and water are in balance. At B, fire has advanced, and at C, water has advanced. At D, fire has again advanced almost to the limits of water. At E, water has mastered fire, it is no longer possible to restore the equilibrium and none of the things that are now would be as it is now.

In modern terms we could express this in a simple graph to which there can be no objection (Fig. 1b). We can consider the cellular equilibrium of anabolism and catabolism, or oxidation and reduction, or the acid-base balance or any similar biological pendulation.

The line A-A represents normal metabolic biotonus, at B, the line of normal physiological limits can be drawn, at C, as well as at C', a line of irreversible membrane permeability is assumed.

Stimulation (catabolism) would first result in an increase in mem-

brane permeability towards B, with resulting reversal toward the line B'. A renewed impact would send this balance toward C, reversal might reach C' and death—in other words, an irreversible change

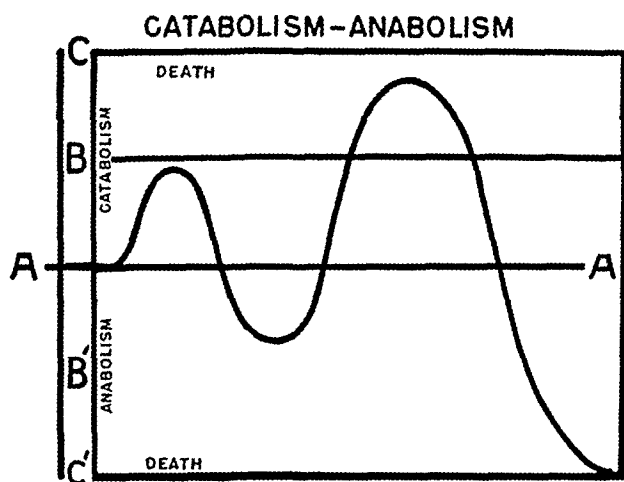


Fig 1b The Unstable Organic Equilibrium in Modern Terms of Catabolism vs Anabolism—of Activity vs Rest—of Permeability vs Impermeability, etc

If we keep in mind the use of the term water as a symbol of matter, and the term fire as representing energy in the balance of fire-water, it is quite understandable when Heraclitus says that it is death to the soul to become water<sup>6</sup>

The quintessence of the human organism (in Hippocratic terms, the finest fire and the finest water), is the immaterial something that the Greeks called soul, we call mind, personality, spirit

This soul, when it becomes water, has returned to the state of being merely matter, a final degradation would be earth, i.e., the growth-source of all nutriment—this is the way down. From earth comes water from water, soul, i.e., the way up—the conclusion being that the way up and the way down are one and the same thing. So also Heraclitus insists that good and bad are the same thing<sup>17</sup>

Heraclitus did not like doctors, so he used the following simile to illustrate this particular point. At any rate doctors



cut, burn, and cruelly rack the sick in that they effect such benefits in sickness <sup>18</sup> *That a substance may be either good or bad, depending on the use to which it is put, is made evident in that sea water is both very pure and very foul, to fishes it is drinkable and healthful, to men it is undrinkable and deadly* <sup>19</sup>

*Naturally this philosophical point of view was not readily understandable to the average man and so Heraclitus says they understand not how that which is at variance with itself agrees with itself There sit attunement of opposite tensions, like that of the bow and of the harp* <sup>20</sup>

*Hippocrates, like Heraclitus, thought in terms of musical vibrations Heraclitus, for instance, says that the opposite is beneficial and from things that differ comes the fairest attunement* <sup>21</sup>

*The statement of Hippocrates that men cannot interpret what they see is Heraclitean in origin Heraclitus said bad witness are eyes and ears to men, if they have souls that understand not their language* <sup>22</sup>

## DISEASE

*Disturbance of the organic balance implied dis-ease, the subconscious or conscious awareness of general or localized disturbances But the disturbance might be reequilibrated*

*But how? The Greeks said that this power resided in physis, in the nature or constitution of the individual We grant the correctness of the underlying thesis, although even today we are baffled how this balance is restored It isn't the individual cell and it isn't the individual organ which initiates the way back We project the autonomic integration, an interplay involving biochemical, biophysical, nervous, endocrine mechanisms, in itself so complex that it eludes a mathematical approach*

*This is teleological but I do not see that we can avoid its acceptance—the 'organism as a whole' definitely sets about to achieve an end which in this instance is reequilibration*

*In recovery, then, we must depend upon the sheer empiricism of the individual case*

Nature (*physis*) heals disease. Inherent mechanisms act automatically as reflexes, much as the reflexes that we use in winking the eyelids or moving the tongue, for nature is active without training and without schooling in these essentials <sup>23</sup>

Healing is a matter of time, but is sometimes also a matter of opportunity. Knowing this, one must attend in medical practice not primarily to plausible theories, but to experience combined with reason.

A theory is a composite memory of things apprehended with sense-perception. For this sense-perception, coming first in experience and conveying to the intellect the things subjected to it, is clearly imaged, and the intellect, receiving these things many times, noting the occasion, the time and the manner, stores them up in itself and remembers.

Now I approve of theorizing also if it lays its foundation in incident, and deduces its conclusions in accordance with phenomena. If theorizing lays its foundation in clear fact, it is bound to exist in the domain of intellect, which itself receives from other sources each of its impressions.

We must conceive of our natures as being stirred and instructed under compulsion by the great variety of things, and the intellect, taking over from nature the impressions, leads us afterwards into truth. But if it begins not from a clear impression, but from a plausible fiction, it often induces grievous and troublesome conditions for all who so act are lost in a blind alley.

Wherefore one must hold fast to facts in generalizations also, and occupy oneself with facts persistently if one is to acquire that ready and infallible habit which we call 'the art of medicine'. For so to do will bestow a very great advantage upon sick folk and medical practitioners. Do not hesitate to inquire of laymen, if thereby there seems likely to result any improvement in treatment. One must pay attention to GENERALITIES IN INCIDENTS, with help and quietness rather than with professions and the excuses that accompany ill success <sup>24</sup>

*This Hippocratic approach, by way of generalities and incidents is of significance for every biologist. The single case leads to certain general rules, never applicable to the single case, because every*

*single case always presents an individual problem which can only be considered from the point of view of the whole. These "generalities" are not laws, they are rules. The medical art steps in when we envisage the individual case in the framework of these general rules.*

The nature of the body must be regarded as a whole, in every consideration of the medical art.<sup>25</sup>

*Here we have the union of art, of exact observation (measurements) and of the actualities of the individual case: rules—art—individualism—a closed circle.*

*There may be laws in physics (though even modern atomic physics has undermined the temple)—but dealing with living organisms we must regard the word laws\* as a dubious designation. Nature operates within the framework of laws but we cannot at the present time define them with assurance.*



*The "piling of law upon law does not in the slightest degree account for the pattern of individuality which each human being unfolds. The person—evades the traditional scientific approach at every step." This is the conclusion of Allport in his PERSONALITY—A PSYCHOLOGICAL INTERPRETATION.<sup>6</sup>*

*"While the goal of all science is the UNIVERSAL PRINCIPLE, of which the individual may be an instance or an example—but of which, equally, he may be a most brazen contradiction!"*

# Theory—II



'Harmony'

## *The Human as a Cosmic Resonator*

### *Synopsis*

*MACROCOSMOS AND MICROCOSMOS* The sun organizes the planetary system The fire (of the seed) organizes embryonic development The dynamic state of equilibrium Integration and disintegration The road up and the road down

*The powers that govern the universe govern the organic world Improper response (too much or too little) results in discomfort or disease*

#### *Therapy*

*Change in the state of the blood The analogy of coagulation and separation (butter production) in milk The fluids and their accumulation The Torricelli experiment*

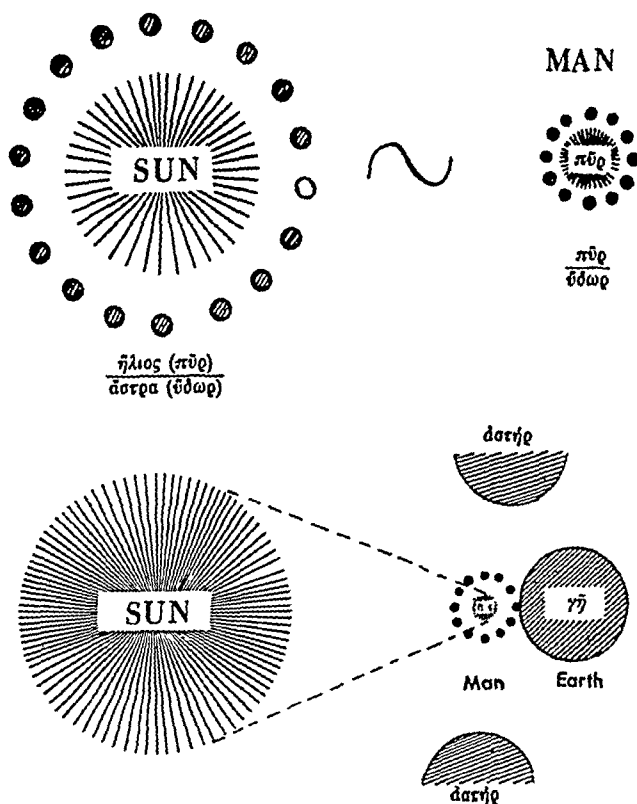
*Trauma The vascular reaction Fatigued tissues Reactivation of focal areas Weather as a factor in disturbance of the humoral and tissue balance Heat and cold as powers The circulatory balance*

NOTES—A *The Microcosmos* B *The Constitution of the Day* C *The Hippocratic Outline of the Constitution of the Year* D *The Unstable Equilibrium*  
—A *Patient with Tuberculosis*

### MACROCOSMOS AND MICROCOSMOS

In a word, all things were arranged in the body, in a fashion conformable to itself, by fire, a copy of the whole (*universe*), the small (*the body*) after the manner of the great (*i.e., the macrocosmos*) and the great after the manner of the small (*microcosmos*)<sup>1</sup> (Fig 2a)

*In the cosmos the sun was the all-powerful factor, the spender of energy which ordered all matter. Its energy was eternal, and although the sun appeared to rise and set, actually it warmed first one side of*



*The Hippocratic Concept of the Macrocosmos and the Microcosmos, i.e., the Inorganic and the Organic World*  
 Fig 2a At the left the sun (fire) surrounded by the planets, including the earth. At the right, Man, as internal fire and material (organs) of the body, organized by that fire.

Fig 2b The sun and the earth (one of the planets) with Man on the surface obtaining energy from the sun and material (air, water, solids) from the earth.

*the earth and then the other (light for Zeus, darkness for Hades, darkness for Hades, light for Zeus).<sup>1</sup>*

*The energy of the sun that governs the universe is analogous to the innate fire that governs the organism. Our mat-*

*ter* (symbolized by water and earth) is set in motion and ordered by this tiny torch kindled by the celestial fire (hottest on the first day of life—coldest on the last) But nothing perishes even in death, both energy (fire) and water (matter) merely undergo transformation Life and death are but phases of the normal cycle of events in nature that go on continuously in everything organic or inorganic

### THE MICROCOSMOS

The spark of energy which was hottest on the first day of life proceeded to organize a small system of material about it, using materials of the earth (water, solids, and air)

So (in Fig. 2b) the human was symbolized as existing between the sun and the earth, deriving energy from the former and matter from the latter

The matter (of the earth and stars and the body) is passive and is organized and utilized by the energy of the sun and the human

The water of the earth is in part evaporated by the heat of the sun, forms clouds and then returns to the earth in the form of rain or snow, in so doing it dissolves the solids, so that the character of the water may be changed (sweet, soft or hard) Plants and animals are built up by such substances

The human spark of energy builds a constellation of organs about it as a center, and of these organs the most significant are the brain, the viscera of the abdomen and the thorax [Note A]

According to the Hippocratic thesis, all organic forces were in a state of flux—upward or downward—life involving the maintenance of an unstable equilibrium between the body and the environment

Undue deviation from the normal biotonus might result in discomfort or disease or death, depending entirely on the possibility of the reestablishment of a working equilibrium

Rest was the normal manner whereby the organism sought to restore the disturbed balance, but the physician might aid by bringing into play measures that were contrary to the state which had resulted in precipitating the discomfort or disease

*So, if as a result of the wet and cold constitution of winter (relative hydration of the tissues, with lessening of buffers and lowered pH), the individual became sick (activation of a tuberculous focus, for instance) then anything that would make the body drier would prove beneficial. We still send our far advanced tuberculosis cases to the desert!*

*In its simplest outline, this is the picture that is unfolded in the Hippocratic texts*

*Hippocrates, closely allied in time as well as in vicinity to Heraclitus and Democritus, could properly envision man in his relation to the universe. He knew of the perfect "attunement of the spheres" and of an orderly sequence of events in a seemingly chaotic world.*

*Heraclitus could write dispassionately of wars as transient disturbances of balance of the organic group.*

*They say that it is unseemly that the sight of wars delights the gods. But it is not unseemly, for noble deeds delight them. Wars and fighting seem to our thoughtlessness terrible, but in the sight of God even these things are not terrible. For God makes everything contribute to the attunement of wholes, as he dispenses the things that benefit, even as Heraclitus says that to God all things are fair and good and just, but men have supposed that some things are unjust, other things just,<sup>2</sup> so Hippocrates could write with similar insight and calm objectivity concerning the disturbances in the microcosmos, the human.*

### THE MEDICAL IMPLICATION

*This provided the general background. In the solution of the problems of human and cosmic integrations (remembering that the Greek physician could know nothing of cells or chemistry, and had none of the tools of modern science) only clinical observation was available to him. Occasionally simple experiments might be carried out, as is evident in the observation that All substances which are cathartic, whether they are given from above or from below or from both directions, have the same effect—they all are irritating and the strong ones particularly so and may bring about inflammation if they are put in some delicate part of the body and the mild ones bring*

about an irritation of the skin when rubbed in in the form of an ointment<sup>3</sup>

# I THE EQUATION—ORGANISM VS COSMOS CHANGES IN THE PHYSICAL STATE OF THE BLOOD

*Now we pursue the following train of ideas* If the metereological conditions are such that they are unfavorable then they master the tissue fluids of the body and they are either heated or cooled (*i e*, *disturbed*) until a disease occurs If the fluids are again brought into equilibrium the patient recovers<sup>4</sup>

*Within relatively recent years an interest in non-specific therapy resulted in a whole series of studies dealing with colloidal-chemical and enzymatic changes occurring in the blood and tissue when the patient was subjected to non-specific effectors (Lumiere, Kapozewski, Jobling and Petersen, etc ) More recently the subject has attracted many investigators who, with refined technique, have developed the field of the changing physical-chemical state of the blood Disequilibrium, with aggregation of larger particles, surface adsorption phenomena, changes in iso-electric potentials, etc are definitely associated with vascular disturbance, as has most recently been beautifully demonstrated by Kinsely Such disturbances are, in turn, associated with the precipitation of clinical symptomatology In malaria such changes are most easily recognizable*

## COAGULATION AND SEPARATION

*Hippocrates considered this identical possibility in the following analogy with which he continues*

The problem of equilibration can best be illustrated by what one finds among the Scythians who prepare mare's milk They pour this into wooden containers and shake it, whereby the fat part which they call butter comes to the surface because it is lighter, and the heavier and thicker part settles down to the bottom wherefrom it can be separated and dried, this is called horsecheese Whey is that portion of the milk which is in between

Now something like that happens in the human when the tissue fluids have gone into disorder



*Hippocrates clearly recognized that the change in the physical state of the fluid milk, when normal dispersion is altered, is similar in some fashion to the change in the fluid blood when the environmental forces are sufficiently strong to cause disequilibrium*

*Here he had to turn again to the current symbols of his day. He did not say that euglobulin or pseudoglobulin or serum albumin or possibly lipoprotein aggregates might be involved, he could not talk of serum protease or antifement*

*So he proceeded in this fashion. The biliary part comes to the surface because it is lightest, the second lightest portion is the blood, then the phlegm, then finally the more heavy portion is the tissue fluid (bile was considered toxic if not in proper proportion to the blood content). Yellow bile (i.e., tissue fluid) is present in greatest amount at the beginning of the disease because it goes to the parts which already contain tissue fluids (i.e., it is being transported from tissue and is going to the inflamed parts where it accumulates) and if too much accumulates, there is pain and heat which may spread over the entire body. It is more apt to occur from an accumulation of the biliary or mucous or blood elements than from tissue fluids. If one gets such a precipitation or accumulation in any particular part of the body, that designates the name (i.e., localization of disease). On the whole, tissue water does not cause much fever*

*If, for instance, there has been a heavy blow, blood accumulates because the vessels in that region have been transiently emptied, but when the flesh has been filled with blood then it is just like a sponge and the blood cannot flow out again but stays there until room is made in some other part of the body because the blood blocks (when it has accumulated) through its amount, the outflow of blood<sup>5</sup>*

### THE TORRICELLI EXPERIMENT

*At this point Hippocrates explains this situation by describing an experiment later named after Torricelli*

*If we take a leather oil bottle with a narrow opening, fill it with oil and then turn it upside down the oil will not run out because the oil blocks the passage, you can do the same thing with the water*

*On the other hand, if you gently incline the bottle of oil or water, you can pour out the substances. The same thing is true of large*

accumulations of fluid in the body This will not flow out until proper digestion has occurred which will permit the outflow<sup>6</sup>

*It is this same thought that crops out in the discussion of stasis anoxia in BREATHS and in the interference of oxygenation of the brain in SACRED DISEASE*

*Hippocrates continues*

If a small accumulation of fluid occurs in the tissues it is gradually resolved, it becomes unnoticeable and painless and the patient makes a complete recovery

If, on the other hand, the tissues become more and more inflamed, they attract more and more fluid, pain is caused everywhere in the body where something from this region is attracted\* and many physicians believe that a rupture (*of a blood vessel*) has occurred here but this isn't possible because a true wound cannot alter its seat Nevertheless a wound-like lesion it certainly resembles in all of its manifestations

No, what we are dealing with is fluid that has been derived from a primary region and which has been transferred through the small vessels If this (*metastasis*) now digesting and becoming larger, persists, it causes pain until it has reached an equilibrium in character and temperature with the other fluids of the body<sup>7</sup>

## TRAUMA

*We now consider the following in connection with the preceding discussion*

When a trauma occurs it is clear that the flesh is broken in the wound BUT THIS I CONSIDER THE SAME AS A DISEASE If a bruise occurs as the result of an injury or fall or something of that sort and the tissues swell, it is due to the fact that trauma has immediately fixed the blood It flows into the dilated vessels and there it accumulates because it has no way of getting out and for this reason there is swelling This swelling continues until the fluids can be absorbed at

\* According to the Hippocratic conception any disturbance of tissue equilibrium would cause pain, either when fluid would be attracted into a new area which would swell and be painful or if something had been removed from a previously well equilibrated area there would be a lack of the necessary components and this, in turn, could cause pain

the seat of the swelling itself or because of surgical interference, relief is afforded

Of course we may then develop an abscess or it may not change (*may organize*)

With physical exercise we have something like it because in those parts WHICH ARE WORKING MOST BLOOD ACCUMULATES, and as a result of this there is pain. If this blood is not properly resorbed and excreted through the gastrointestinal tract or the bladder then we are liable to have a febrile reaction. The degree of the febrile reaction depends on the equilibrium between the normal tissue and the tissue which it passed through into the active tissues.<sup>8</sup>

*The practical application is immediately made that stasis (fluid accumulation) and arthritis (rheumatism) occur mostly in people who have previously recovered, because if a nidus that has not been completely healed remains and finds no exit, either towards the skin or toward the inner parts, an inflammatory nodule occurs and fluids are again attracted and cause definite stasis and inflammation.<sup>9</sup>*

## II ORGANISM VS COSMOS THE WEATHER AS A PRIMARY FACTOR IN DISTURBING HUMOURAL BALANCE

*The weather was of primary significance in the whole [Note B] scheme of organic pendulation because change in the air which surrounded the individual was the major factor in changing this balance. This for several reasons*

(1) *Because heat and cold change the circulatory balance, (a) with heat the peripheral vessels were dilated, while with cold the blood was driven to the interior of the body*

(2) *Change in the air changes the brain—"the brain first perceives the intelligence coming from the air" The brain became moist or dry, (i.e., changed its state) and the brain governed the body'*

*As a result, the change of the air was reflected in the day by day change in the humours, i.e., the balance of BLOOD, MUCUS, (the colorless fluid of the body) YELLOW BILE (the yellow fluid possibly so identified from serum after blood clotting and contraction), and BLACK BILE, i.e., biliary secretion and recognized by Hippocrates as derived from the blood because this increased its domination in the*

*summer as the result of possible destruction of excessive blood formed in the spring [Note C]*

*There were in addition changes in the general trends toward hydration or dehydration, etc associated with change in season, and the years also differed, i.e., nothing was ever quite alike though alike!*

*Consequently a "cold snap" in the spring might be definitely effective in causing erysipelas, the while a "cold snap" in the autumn might "brace the body"*

*The detailed delineation presented in [Note D] will illustrate that the clinical observations upon whom this thesis was built are valid when we study the human in day by day fashion*

### HEAT AND COLD

Of all the powers (*properties or forces*), none hold less sway in the body than heat and cold. My reasons are these. So long as the hot and the cold in the body are mixed up together, they cause no pain. For the hot is tempered and moderated by the cold and the cold by the hot. But when either is entirely separated from the other then it causes pain. And in that case when cold comes upon a man and causes him some pain, for that very reason internal heat first is present quickly and spontaneously, without needing any help or preparation. The result is the same whether men be diseased or in health.<sup>10</sup>

*On casual reading this could be interpreted to indicate that temperature changes are of least significance among the environmental factors. On the contrary, Hippocrates states that the mechanisms of adjustment to heat and cold are perfect!*

*When the temperature balance is in equilibrium there is no discomfort (nor do disease symptoms become evident). But when chilled, the body usually responds by proper stimulation to heat production. The regulation of the temperature balance, according to the Hippocratic notion, involved the balance of food ingested and used, the water balance, and evaporation from the lungs and skin.*

The tiny blood vessels of the skin, dilated by blood, bring the fever glow to the surface and rapidly dissipate the heat. They carry away the surplus of fat as yellow bile (*tissue fluid*) and blood surplus as black bile (*bile pigment*).<sup>11</sup>

*Quite apart from the recognition of the function of the skin and its vessels as radiators, here is the clear-cut statement that liver bile is derived from the destruction of blood*

Tissue fluids (*yellow bile*) take on the color of the food and drink and this is true, too, of the inner fluids in the tissues <sup>12</sup>

### THE CIRCULATORY BALANCE

During cold, blood retreats to the inner portion of the body and causes inhibition of the gut, so, too, during sleep, the blood retreats into the interior <sup>13</sup>

Now chilling in diseases occurs from environmental factors—wind, rain, clear sky as well,\* and similar causes, but also from changes that occur within the body itself, particularly if bile and mucus (*inflammation*) join at any one place. The blood then becomes more fluid and of course when the blood is fluid, the entire body has to be more fluid. The vessels then contract and while the blood is contracted and firmer the patient trembles. Later when there is warmth again it exerts its normal power and returns to its normal condition. Then the bile and mucus which has accumulated in it, (*i.e., inflammatory reaction*) is gradually warmed, the blood becomes warmer than it has been before <sup>14</sup>

*Here we again are face to face with one of those amazing statements of Hippocrates. In inflammation the blood certainly changes, and we deal with changes in hydration, and the vessels contract. They do, first, because of a general sympathicotonia, secondly, because of a compensatory mechanism initiated to cope with loss of fluids and vascular fatigue in certain parts of the body. In the course of compensation the blood vessels contract and are firmer, the patient trembles!*

Disease through cold is brought about by the fact that one part of the fluid in the body is contracted and concentrated and the other is spread over the body and secreted. This process too, can be compared to milk because if one takes rennin (or lab ferment from the fig) the milk coagulates because of the cold thereby induced and whey forms

\* The "clear, bright air after the storm" which underlies the word Asklepios (the God of Healing) corresponds to the passage of a polar air mass with resulting increase in blood pressure. While the normal individual may feel stimulated and buoyant, the vasoconstriction may accentuate organ inadequacy, and cause precipitation of disease symptoms

Something like that happens in the body when we have environmental influences. Fluids contract and become concentrated and then we get a faulty mixture of the other fluid constituents with the tissue fluids. If this reaches the gastrointestinal tract we get gastrointestinal disturbance with pain in the belly, without great harm however. The hair, too, becomes erect when the superficial vessels contract and become drier than they were before. They do this because the tissue water has been secreted toward (internal!) the bone. The rest of the tissue fluids can be distributed to the belly and there it is not particularly harmful if the gastrointestinal tract is empty, but if the gastrointestinal tract is filled then this excess of fluid may be deflected to the chest or to some other organ.<sup>15</sup>

#### ANALOGOUS EFFECTS OF UNDUE HEAT AND COLD

*One of the most striking observations in the Hippocratic texts is contained in the following paragraph. But excessive cold, whether of breaths, food or drink, congeals the moisture of the body, and binds the bowels by the congealing and the cold, for it overpowers the moisture of the soul. Then again excessive heat too causes congealing to such an extent as to prevent diffusion.*<sup>16</sup>

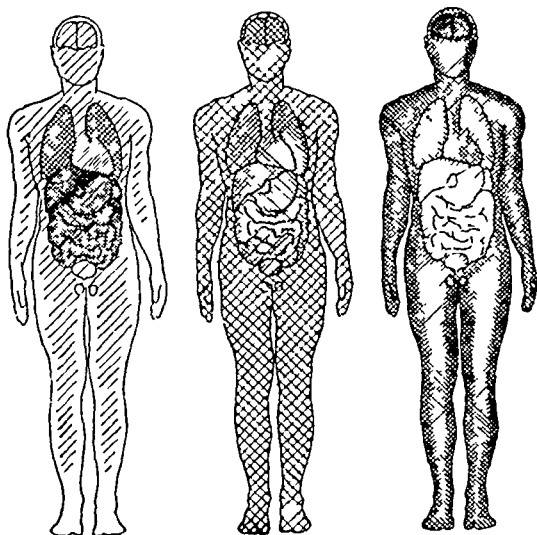
*Extremes of cold or heat lessen diffusion! Opposites may bring about like physiological effects. This is not logical, nor is it scientifically proper, statistically, it is a headache. But it is true, and biochemically sound.*

*When we take blood from the arm of an individual subjected to cold, the pH at first is bound to increase. The reason for this lies in a series of changes. Catabolism is decreased peripherally, there is less CO<sub>2</sub> produced. With such a transient alkalosis the tissue membranes are literally less permeable.*

*When we take blood from the arm of an individual subjected to unusual heat, we find a similar transient alkalosis, but in this instance the cause is different. We lose chlorides by sweating, the rapid passage of the blood through the vascular bed keeps it relatively more alkaline, and in addition to that the concomitant increase in ventilation, associated with adjustment to heat, keeps the general blood level more alkaline.*

*Under such conditions both excessive heat and excessive cold may bring about a transient increase in relative alkalinity and with this, lessened transfer of oxygen and lessened permeability of capillaries to an extent that will lessen diffusion!*

*How could Hippocrates reach this conclusion on purely clinical observation? Observing superficial wounds and abscissions, or change in the swelling of the joints? The observation may have had its origin in the different effects on gastrointestinal activity Cold, with increase*



*Fig 3 Changing Distribution of Blood Mass under Differing Environmental Conditions Center figure—normal distribution, left—peripheral constriction with cold or related states, right—peripheral dilatation with undue heat or related states*

*in smooth muscle tone of the gut, may cause constipation, excessive heat because of the associated dehydration, and inspissation of the intestinal contents, may also result in constipation*

*These diametrically opposite physiological states in the vascularization of the body are best illustrated in a simple diagram (Fig 3)*

*The middle figure represents an intermediary position of blood mass distribution, being approximately evenly divided between the peripheral and the splanchnic area*

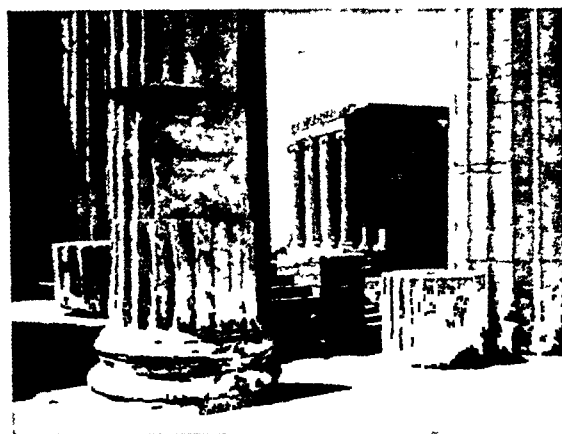
*To the right the surface acts as a radiator. The deeper tissues will, in general, be depleted. Incidental thereto, the mucous membranes*

of the gut are apt to be relatively deficient and a variety of gastrointestinal disturbances occur, in part due to inability to handle the adjustment to bacteria, etc (diarrhea), in part due to accentuation of smooth muscle tone and spasm (obstruction, appendicitis, gall bladder colics, colitis, etc ).

To the left the surface acts as an insulator. The viscera are relatively plethoric. With this state, blood pressures increase and smooth muscle tone is in general raised. The relative bloodlessness of the mucous membranes and skin may enhance the opportunity for infection (heipes!). This is the state of the organism when the north winds blow and, in general, that of winter.

Well aware of these general effects, the Hippocratic physician accentuated them and made use of them as adjuncts in regimen. Exercises in dust differ from those in oil, thus dust is cold,\* oil is warm. In winter oil promotes growth more, because it prevents the cold from being carried from the body. In summer, oil, producing excess of heat, melts the flesh, when the latter is heated by the season, by the oil and by the exercise. In summer it is exercise in dust that promotes growth more, for by cooling the body it prevents its being heated to excess. But in winter dust is chilling, or even freezing. To remain in the dust after exercise in summer benefits by its cooling property, if it be for a short time, if it be for long, it dries the body to excess and renders it hard as wood.<sup>17</sup>

\* By increasing the surface for evaporation





## RESUMPTION

# The Tragedy of Too Much and Too Early



I

### HIPPOCRATES

*While selecting and organizing the material that has been gathered into the chapters of this book, I have at times sensed the inherent tragedy*

*In the shadowy background of fifth century Greece there came into being a great mind—of cosmic comprehension, of intuitive penetration, of thoroughly human understanding and sympathy, with an eerie sense-perception of the subtle mysteries binding the organic to the inorganic world*

*Centered in this one individual and in the books which we group as Hippocratic, there was available not only a wealth of factual material but possibly an even greater value, namely an absolutely objective scientific approach to biology and medicine. But we did not push open the doorway of the temple of knowledge that Hippocrates had fashioned*

*The tragedy was not too little and too late, the tragedy was too much and too early! The soil was not prepared. Scholars read, physicians pondered, but they could not fathom the invisible from the visible!*

*In a discussion some years ago with Professor Jones at Cambridge,*

*the question that interested us was not 'what did Hippocrates really know?' but 'how could Hippocrates have known so much about so many things?' The student of Hippocrates, whether scholar or physician, simply has no answer*

*"The salient and important truth is that in the latter half of the fifth century works were written, probably by the same author, embodying a consistent doctrine of medical theory and practice, free from both superstition and philosophy, setting forth a rational empiricism of a strictly scientific character" (Jones, General Introduction Hippocrates, Volume I)*

*What a singular phenomenon The physician who had an understanding of the body and its dysfunctions unsurpassed for twenty-three centuries*

*A comprehension of the place of the human in the framework of the cosmos*

*Who thought of the organism as a whole, and the environment as a whole*

*Who had knowledge of organ integration within the body—every part correlated with every other part*

*Who fathomed the unstable organic balance of the many interrelated rhythms—the VIS MEDICATRIX NATURAE—with its natural effort at the correction of disturbance, and who made practical application of this knowledge by aiding re-equilibration*

*Who possessed complete mastery of the arts—whether medical, psychological or surgical*

*Whose character encompassed moral grandeur—the humanity of the physician with the humility of the great philosopher, together with the artistry of the poet*

*Long before Omar Khayyám he wrote that*

Potters spin a wheel which shifts neither forwards nor backwards, yet moves both ways at once, therein copying the revolutions of the universe. On this wheel as it revolves they make pottery of every shape, and no two pieces are alike, though they are made from the same materials and with the same tools. Men and animals, too, are in the same case

*Who could describe the metabolic cycle in poetic symbolism to which, I believe, every enzyme chemist could subscribe.*

All other things are set in due order, both the soul of man and likewise his body. Into man enter parts of parts and wholes of wholes, containing a mixture of fire and water (*energy and matter*), some to take and others to give. Those that take give increase, those that give make diminution. Men saw a log, the one pulls and the other pushes, but herein they do the same thing, and while making less they make more. Such is the nature of man. One part pushes, the other pulls, one part gives, the other takes. Each keeps its own place, the parts going to the less are sorted out to the smaller place, those advancing to the greater mingle and pass to the greater rank, and the strange parts, being unsuitable, are thrust from a place that is not theirs.<sup>1</sup>

*It is possible that we, who have lived during the epoch of great therapeutic advance\* as well as the students who enter the field of medicine when this development is proceeding at an accelerated pace, may feel that Hippocratic wisdom is wholly out of date.*

*These very advances in therapeutic intervention have led away from a broad concept of the causation of disease. Who need care about the why of disease when the remedy is immediately at hand?*

*The student sees a coryza in the department of otolaryngology, a spontaneous abortion in obstetrics, an endocarditis in medicine, a retinal thrombosis in ophthalmology, a prostatic episode in the genitourinary department, a hypomania in psychiatry, a diverticulitis in surgery, or a Bell's palsy in neurology without ever being faintly conscious of the connecting link that might make an intelligible and coherent picture of the tangled skeins. He never considers the patient as a whole in the environment as a whole.*

*Cohnheim, the protagonist of Koch, still had a comprehensive pic-*

\* Specific serum therapy [von Behring], specific chemotherapy, [Ehrlich—salvarsan, Domagik—prontosil], the isolation of the endocrines and vitamins, of penicillin and related agents.

ture and so, too, did Tendeloo But today the disintegrating trends are far stronger than the integrating

Kapfeler, in his Foreword to PLACES IN THE BODY, advances the idea that, though we may now be cognizant of the individual facts, we are ignorant of the interrelations

"Everyone knows," he said, "that with a rapid change in temperature (chilling or heating) the majority of the people remain well but a certain number become ill—one develops a cold, the next an otitis, the third a laryngitis, the fourth a bronchitis, the fifth a nephritis, the sixth a myelitis, finally, one an acute rheumatism In each case we consider the effect of cold, or of chilling, or draft, or diening, without for a moment considering the metabolic effects that are inherent in adjustment to the weather changes that cause the varied clinical phenomena It was the genius of Hippocrates who grasped the common bond The student should have the benefit of the clarification and understanding that the total concept alone can give him "

## II

### THE ERA

Having a thorough understanding of the organic integration with the cosmos, Hippocrates could think as well as express his thoughts in simple prose of an enduring majesty and of power He observed carefully, he evaluated critically, he interpreted correctly Considering the time and place, it was not bravado that led him to write that clear knowledge about natural science can be gained from medicine and from no other source [See Note D, Introduction]

*The human was the best possible object of study—the instrument upon which his intellect could concentrate, the reagent that signalled the effect of the changing environment—an antenna that received and amplified the silent commands of the Cosmic Master.*

*A complex and unbelievably sensitive instrument it is, this human, but for the Hippocratic mind its very complexity made it but the more useful*

*For example, the matter of keeping the individual in health*

It is impossible to treat of the regimen of men with such a nicety as to make the exercises exactly proportionate to the amount of food. There are many things to prevent this. First, the constitutions of men differ, dry constitutions, for instance, are more or less dry as compared with themselves or as compared with one another. Similarly with moist constitutions, or with those of any other kind. Then the various ages have different needs. Moreover, there are the situations of districts, the shiftings of the winds, the changes of the seasons, and the constitution of the year. Foods themselves exhibit many differences, the differences between wheat and wheat, wine and wine, and those of the various other articles of diet, all prevent its being possible to lay down rigidly exact rules in writing. But the discovery that I have made is how to diagnose what is the overpowering element in the body, whether exercises overpower food or food overpowers exercises, how to cure each excess, and to insure good health so as to prevent the approach of disease, unless very serious and many blunders be made.

*For instance*, those with physiques that are fleshy, soft and red, find it beneficial to adopt a rather dry regimen for the greater part of the year. For the nature of these physiques is moist. Those that are lean and sinewy, whether ruddy or dark, should adopt a moister regimen for the greater part of the time, for the bodies of such are constitutionally dry. Young people also do well to adopt a softer and moister regimen, for this age is dry, and young bodies are firm. Older people should have a drier kind of diet, for bodies at this age are moist and soft and cold. So in fixing regimen pay attention to age, season, habit, land, and physique, and counteract the prevailing heat or cold. For in this way will the best health be enjoyed.<sup>2</sup>

*And the different types have different potentials as far as longevity is concerned.* So, those who are constitutionally very fat are more apt to die quickly than those who are thin.<sup>3</sup>

*It is just this ability to pay attention to the minutest detail without for an instant forgetting the cosmic pattern—the laws that govern all things both here and there—that makes the Hippocratic literature so great that its shadow still reaches to our day—or, must we surmise, our night?*

*The Hippocratic torch was dimmed for ages Will the magnificent flame of our science be dimmed by global planners of empire who imagine that natural laws do not govern all things?*

*Or will the very profound knowledge of the details of organic metabolism so absorb the interest of the physician that he no longer envisages the whole? Must he glide over depths of knowledge and merely prescribe remedies so alluringly brought to his desk by propaganda literature in four colors on polished papyrus or friendly detail men?*

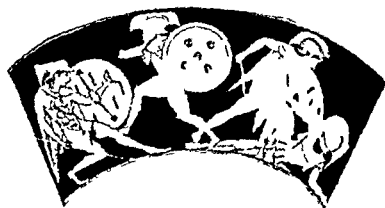
*Our age is one very much like the Hippocratic—Witness the clashing impact of empires and the march of the legions—the transition state of social forms—the ambiguous shibboleths, the confusion of the patriot, and the cunning of the tyrants*

*Marathon was fought thirty-five years before the birth of Hippocrates, when he was born, the Persians were invading Egypt, when he was thirty, the Great Plague of Athens occurred, Athens was crushed when he was in his fifties When he died, Athens and Sparta were locked in battle!*

*Earthquake and Tempest, Plague and Suffering, Fire and Sword were in the ascendancy Hunger vied with luxury—treachery and betrayal with integrity, falsehood and malicious rumor with frank speech and truth, Persian gold and acclaim with the silence of brave death*

*The Greeks died, but truths that the philosophers and scientists proclaimed, lived on*





## III

## 'LE MIRACLE GREC'

*The reader may recall that in the discussion of dislocations, Hippocrates suddenly broke the train of medical explanation to throw into the mental arena the question, Why? Why do dislocations occur? With an implied apology and buttressed by a quotation from Homer, he turned from dislocations in humans to dislocations in cattle, to make evident that the condition of the tissues has to do with the problem at hand*

*So now, before ending the excursion, shall we turn to the most interesting of queries—the why and the how of this personality that we have examined, the personality that permeates the logical discussion, as it does the pungent sentences—this person Hippocrates?*

*We take genius for granted—as we do many unusual things. The uncommon, accepted as a commonplace, arouses no great curiosity—but almost savors of the occult when the question is projected*

*Why too much and too early?*

*Hippocrates suggested the answer when he observed that the greater the environmental variability the greater the output of organic variants—of more unusual persons. And the era of Hippocrates, as we have seen, was one of greatest turmoil*

*Hippocrates was one genius among many. He was part and parcel of a galaxy, when, to quote Bonman,<sup>4</sup> "a heretofore unknown world revealed itself and an insight was obtained, the consequences of which were incalculable. It seemed that a miracle had happened, for were not its origins inexplicable and wholly mysterious? A happy convergence of possibilities and the coincidence of a series of events in Hellas caused this miracle in the beginning of the last mil-*

*lennium before our era It is the wonder of the 'new birth',  
'LE MIRACLE GREC' "*

"This new world of the spirit was created by a number of exceptionally gifted men This group was small quantitatively, for it probably contained hardly two hundred names, but great qualitatively, and surprisingly great relatively, because never before or after have there been born so many great minds in so small an area and in the short period of a few centuries"

Bouman was interested in studying the various factors that may have been operative in this curious clustering of genius—for though this Greek period is outstanding, similar periodicity has been noted in later centuries Europe and America revealed a crest in the production of unusual individuals late in the eighteenth century, sometime between the period of our Revolution and the Napoleonic era [Note A]

Is it possible that even here cosmic factors of the character that interested Hippocrates may have been at work? He incriminated inorganic variability (weather and season) in the production of greater organic variations in mankind. He wrote that the development of the embryo might be altered With greater variability, greater opportunity for genius

We have one definite fact in the history of solar events that merits examination in this connection In a translated paper,<sup>5</sup> Fritz, of the Zurich Observatory says

"As the tables show, there occur so many periods of eleven years, near eleven years, or intervals of years nearly divisible by eleven between the dates of which the phenomena were observed in earliest times (the phenomena referred to include the records of the Aurora Borealis, earthquakes, unusual floods, etc.) that it must appear unquestionable that this eleven year period and its recognition does not belong only to modern times Previous to the year 190 B C the data become far more scanty The material is limited almost wholly to a number of northern lights—of which those of 465 B C when the sky was lighted up for seventy-five days, and those of 443 B C, when there were similar phenomena for sixty days are most remarkable"



Note the years 465 B C and 443 B C , when an apparently all time high (at least for recorded experience) was indicated in solar turbulence. These two periods were 22 years apart, and represent a double sun spot cycle

*This was not only a crest in solar turbulence, it was also the time of the greatest production of genius as well!*

*That this was a period when there was a marked climatic shift has been discussed by Wheeler. Temperatures probably changed to the warm side after it had been cold and dry, and with it came the incredible advance in philosophy, in mathematics, in astronomy, in medicine, in art and architecture, in poetry, in prose and drama. But all this was associated with major shifts in state power, with the rise and fall of empires—the Lydian—the Persian—the Athenian—the Alexandrian, with swift changes in social form, in habits, and in the outlook of the human race \**

*Bouman selected a group of seventy-eight of the most gifted men of the period which stretched from the Seventh to the Third Century, B C. For these the year of birth of forty-eight men of genius could be obtained. They were distributed over the several centuries as follows*

<i>Before the 7th century</i>	<i>2</i>
<i>In the 2th century</i>	<i>9</i>
<i>In the 6th century</i>	<i>14</i>
<i>In the 5th century</i>	<i>17</i>
<i>In the 4th century</i>	<i>6</i>

\* B C 470—Revolt of Naxos

468—The Victories of Cimon

466—The Downfall of the Tyrants in Sicily

465—The Revolt of Thasos

The Death of Xerxes

464—Earthquakes in Sparta

Revolt of Messina

463—Capitulation of Thasos

462—Revolt in Egypt

461—The Fall of the Areopagus

460—The Birth of Hippocrates and Democritus

*It was certainly a period of unrest!*

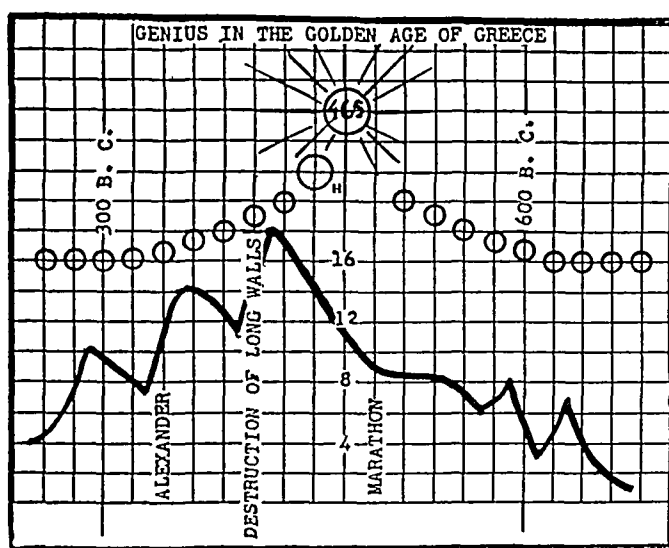


Fig 4 The Production of Genius in the Golden Age of Greece Spaced by the Double Sun Spot Cycles (23 Years), Cresting in the Year 465 B C Ten such periods extend to either side There is indicated the time of the Battle of Marathon (1), the Destruction of the Long Walls (2), the Rise of Alexander (3) The steep rise in the curve, with its crest after the period of the great sun spot turbulence is of interest

I have selected a group of approximately 175 men, and then approximate birth years are indicated on the graph (Fig 4) in cycles spaced 23 years apart (i.e., two sun spot cycles), using the year 465 as the axis of greatest solar turbulence

And now the reader, glancing at the graph, will note the year 465, with its all-time high in solar turbulence. This was but five years before the time when, presumably, Hippocrates was born.

Hippocrates himself witnessed the prolonged *Aurora Borealis* of the year 442—the obvious evidence of vast cosmic disturbance. He lived during the era of great political turmoil—when social structures and moral values alike crumbled. The established order, giving road to dictatorships—to the right and to the left—ended in security for the Greeks, the Romans providing the security. Came the day when every good Roman could afford his Greek physician—as a slave.

Then the torch that was Greece—that rarest fire, imperceptible

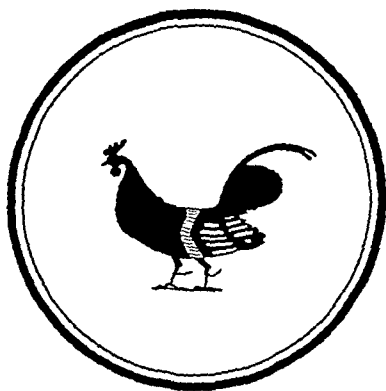
to sight or touch wherein are soul and mind and spirit, *was extinguished by the dread flood of densest water—that symbol of the crushing burden of Roman materialism and imperialism*

*For three hundred and fifty years an Aurora flashed never equalled radiance across the sky of the human mind. Then came the night*

*Since the Renaissance we, too, have adventured joyously, fashioned new worlds, conceived great beauties, dreamed visions, while pushing forward the frontiers of knowledge in majestic stride*

*But now the din of clashing arms—the turmoil of empires—the groan of the dying—the throbbing pulse beat of vast industry seems ominously interspersed by deep rumbling tremors and the muffled splash of social structures sinking into the flood waters of an all-engulfing materialism*

*Is mankind now to know that peace that was the death of Greece? Must we share Socrates' foretoken and sacrifice a cock to Asclepius in final tribute?*



*God, whose law it is that he who learns must suffer. And even in our sleep pain that cannot forget, falls drop by drop upon the heart, and in our own despite, against our will, comes wisdom to us by the awful grace of God*  
AESCHYLUS

# Appendix

## *Notes to the Text and References*



In these notes all Hippocratic quotations are in italics



## INTRODUCTION

### NOTES

#### NOTE A—The Authors of the Hippocratic Texts

Students of the Hippocratic Texts have for ages discussed the problem whether a physician, Hippocrates, presumably born in the year 460 B C, and associated with COS, the ancient island health resort off the coast of Asia Minor, was the author of the various texts that have been grouped under that name, or whether the collection contained material from many authors

With this problem and its discussion we shall not be concerned I shall identify the whole with the name Hippocrates because it will be less confusing to the reader Obviously we must assume that additions, omissions, errors, and revisions have altered the texts—that some are not Coan, but reflect other schools of thought, that they cover a longer time period than that of the life span of one individual, and, finally, that they transmit accumulated wisdom of the Ionian physician group antedating the life of Hippocrates

For my purposes these problems are of no great significance I have been interested solely in presenting the broad and straight line of thought that runs through AIRS, WATERS, PLACES, BREATHS, SACRED DISEASE, REGIMEN, THE NATURE OF MAN and ANCIENT MEDICINE Stripped of tangled vines and underbrush, there is unfolded a magnificent conceptual vision of man as related to the environment in which he has evolved and lives, and of an organic balance in the normal body which maintains an equilibrium with all environmental influences of the world and the cosmos, this, when disturbed, comes to consciousness as disease and leads to death when re-equilibration is no longer possible

The interpretation is thus physiological and medical, not philological and historical [see Note B] Of course I have been influenced by the reading of many studies, by the notations of learned translators—particularly by Littré, Jones, and by Kapferer Recent commentators vary in their approach—from the artistic, such as that of Hans Much, to the colorless and possibly confusing of Heidel<sup>15</sup> I have accepted by preference the translation of Jones, but have also used Sticker, Littré and Kuehlewein for comparison

#### NOTE B—Medical Interpretation

Pitschaft<sup>16</sup> ventured the opinion that "only a physician should interpret the Hippocratic texts, for the opinions of the schoolman can have little usefulness in so practical a field as medicine—our simpler approach is closer to the problems of real life"

Despite an inclination to brevity, I consider it worth while to quote the following from the introductory essay by Hans Much<sup>3</sup>

"Only a physician is justified in interpreting the physician Hippocrates. Should others wish to discuss Hippocrates, they should confine themselves to the religiophilosophic or purely humanistic phases. The medical phase is our province—more than that, it is our duty—a duty which, I must confess, we have shamefully neglected."

Hans Much goes on to say that "academic trends have always been matters of mode, and unfortunately fashion does exist in medicine.\* Even if the direction of our recent academic progress diverges from the Hippocratic, it might still be proper to make evident to the student what way this direction followed AND WHY, rather than proceeding in disdainful silence. Today, unfortunately, the name of Hippocrates has no meaning whatsoever."

NOTE C—Andrews, Edmund

The death of Edmund Andrews, who had planned to collaborate with me in developing a modern interpretation of the Hippocratic texts, involved not only the loss of a personal friend and coworker whose intriguingly frank and original approach would have been invaluable, but a scholar whose competence in the field would have fully justified the critical reexamination of selected material from the texts that we had contemplated.

As an example I quote the Jones' translation of the first two paragraphs of *Heracleitus*:

I "It is wise to listen, not to me but to the Word, and to confess that all things are one."

II "This Word, which is ever true, men prove as incapable of understanding when they hear it for the first time as before they have heard it at all. For although all things happen in accordance with this word, men seem as though they had no experience thereof, when they make experiment with such words and works as I relate, dividing each thing according to its nature and setting forth how it really is. The rest of men know not what they do when awake, just as they forget what they do when asleep."

#### ANDREWS' VERSION

Then for comparison I present the Andrews' version, with his notes:

I It were wise not to hearken to me but to listen to the voice of reason and to acknowledge the principle of the essential unity of Nature.

Now how could it have meant anything but this? After all a man whom Aristotle revered and annotated couldn't have written as Jones would have it:

1 The *alla* does not separate, but joins the *me* and the *logos*. Otherwise another conjunction would have been used.

\* We may be wrong in our reasoning on the cause of certain fluctuations in trends of research, but most of us will agree that investigational work goes in fads or cycles just as certain styles dominate the wearing apparel of both sexes of the human species. (Miller, E. C., FORTY YEARS OF PLANT PHYSIOLOGY, SCIENCE 97: 315, 1943.)

2 'A capitalized Word' is piffle for logos' It's positively Biblical and smacks of a bewhiskered Jehovah, whom the Greeks were spared for five more centuries It is defined in dictionaries as reason, and what did our word logic come from?

3 "Homologein" implied no confessional, as Jones' text implies Nouns from this stem are postulate, principles, etc Our "homologous" might have suggested that

4 'Panta—all, or everything—was the ordinary Greek word for Nature'

II Men are born incapable of understanding true logic, not only before they study it, but even when they study it the first time All natural phenomena must have a logical basis, but wise men act like ignoramuses when they first try to comprehend such definitions and mechanisms as I intend to make the basis of my case, interpreting each one according to its own properties and trying to devise a true cosmogeny The average man is not conscious of his actions when awake, any more than he knows what he does when asleep

'This may seem a bit high flown, but at least it makes sense There is not a single word translated in terms that cannot be found as definitions even in a small Greek dictionary Furthermore I feel sure that it was what Heracleitus was trying to get across Note the sharp variation in my renderings of *epion kai ergon*' and of *diegnumi* They are quite in accord with ordinary Greek usage The translation of *phrazon okos echei*" may seem a TOUR DE FORCE, but I think it a much more accurate rendering of the peculiar idiom than Jones 'Echei does not mean is,' it means has" The whole idiom reminds us of our slang 'what have you'

Andrews sketched a pithy introduction which I have here inserted without alteration, that its character may be preserved

"This little volume is not, as might at first appear, undertaken in a spirit of irreverence Quite on the contrary, it is the result of hero worship Not a word has been put into Hippocrates' mouth that is not present in his texts

"Our hero has suffered for 2300 years from a plague of interpreters The only really scholarly thing that Galen ever did was to attempt to interpret him Today no one has the patience to plod through his commentaries, but suffice it to say that he had a real and honest worship—he did his best and had no shame in admitting his utter incompetence to make any earthly sense out of much of it He always says little, too, but that little sometimes betrays doubt After him most comment may be dismissed as pure vaporizing

"The real difficulty is that we are dealing with a being who became almost deified during his own lifetime Everything he wrote (or might have written) assumes an importance out of all proportion to its gravity Let us begin by making a frank examination of this material

"Even a tyro in Greek can see at once that various passages are written in dialects that differ from each other as much as W D Howells does from George Ade The whole melange is smeared over with a thick but transparent frosting of utterly false Ionicisms \* It is as silly as a French-Canadian-born immigrant in New England moving to the South, and adopting a southern

\* The original inhabitants of the Pentapolis were Doric



accent Even the divisions are false, as the changes of subject are at times helplessly bewildering They could easily be straightened out, but that would be sacrilege

"First then, must we sort out the 'true' passages, as scholars have done for 2500 years? By all means, No! On the contrary, let us pick out representative passages and place them before the reader in such a way as neither to appall him with their magnitude or nauseate him with their silliness

"Much of Hippocrates is silly He was a man, not a god, and a man of the 5th century B C Why waste anyone's time detailing all the foolish ideas of bygone millennia Naturally he shared most of them What cannot help but jolt the modern reader, however, are the things he did know They are legion and enough to fill two books such as this with data, surprising to the 20th century reader

"To return to the actual texts, the obvious thing is that most of them were never intended for publication A few are lectures to the laity Many are hopelessly contradictory of one another One group even 'boosts' the doctrines of his greatest rivals—the school at Cnidos Many are ungrammatical notes, clearly simply jottings for future amplification at some leisure moment An other set is painfully incomplete For instance, Hippocrates' greatest work was probably 'AIRS, WATERS, PLACES,' the first few sections of which are utterly unintelligible I defy any scholar to draw a diagram of how the towns faced and from where the winds blew

"Worst of all, however, is the fact that our hero was a philosopher He was hence well versed in that peculiarly abrupt telegraphic lingo whose solution has been the cause of untold heartaches until modern Greek scholars guessed the correct answer That is, that it was intentionally misleading—a sort of secret code by which members of the initiated pass on cosmic thought to others of the favored few

'Finally as to the words we put into Hippocrates' mouth Every one is a direct translation from some text or other In the Appendix will be found the reference to chapter and verse of the original Greek Such a method at once lays one open to the charge of indirect misquotation by changes in context This may be a very serious charge I can only say that we have tried desperately to avoid such pitfalls and have always been acutely conscious of the inherent faults of the method and its possibilities for leading one astray

'Finally, a word as to the character of the translated sentences In the past Hippocrates was utterly unreadable, first because of the enormous magnitude and secondly, because translators felt it in keeping with the spirit of the text to interlard their own passage with English words almost as strange to the modern doctor as the Greek ones were—in fact, often much more so This has at times been intentional, but is more often due to the fact that the English translator, being hopelessly ignorant of modern medicine, often looked up his words in Greek dictionaries published half a century or more ago, as many of the best were" E A

## NOTE D—The Main Line of the Hippocratic Thesis—Anoxia

Of course there are many contradictory passages in the Hippocratic texts. And why not? In succeeding centuries scribes and authors so added, deleted, altered, revised and rewrote parts and wholes that today it is practically impossible to cull out the exact material which may originally have been truly Hippocratic.

I have sought only to follow an apparently original line of thought that binds the whole—a thesis that is foreshadowed in ANCIENT MEDICINE, is basic (but overgrown with weeds) in BREATHS, carries through in SACRED DISEASE and REGIMEN, and finds its clearest expression in AIRS, WATERS, PLACES.

Neither the classicist nor the philologist will find anything of particular interest in this book, for it is written purposely and only with the idea of its possible usefulness for the student who is approaching medicine. The general reader, interested in observing the acuity of the Hippocratic mind, with its breadth of knowledge (unencumbered by the minutiae of modern detailed science), the lofty ethical plane and character that underlies the whole, may, I hope, be sufficiently stimulated to read into the original.

Primarily, the Hippocratic approach is holistic, using the term that Smuts<sup>17</sup> and Bews<sup>18</sup> have popularized, it is an effort to view man in the framework of the entire cosmos<sup>1</sup>—an appreciation that finds direct recognition in Plato's discussion (PHAEDRUS<sup>19</sup>). This thesis is followed in logical sequence in the major texts that have been mentioned, and each amplifies and supports points that are brought up in the others. It is to Kapferer's<sup>20</sup> credit that he has brushed aside certain philological and chronological objections and made clear the underlying unity of the Hippocratic tenets.

The FIRST part of the Hippocratic exposition has to do with the effort to understand the cause of disease, i.e., with constitution—morphological, physiological, developmental (REGIMEN I). The point is made that the organic balance consists of an interplay of energy (fire) and matter (water), functionally to be thought of as (a) breakdown (i.e., catabolism), and (b) buildup (anabolism).

The SECOND part of the program concerns the investigation of the effect of regimen, i.e., the conduct of life in all its phases, as geared to a proper energy expenditure (work). In REGIMEN II AND III a discussion of the

*And it is necessary, as it appears, to discern the power of the various exercises, both natural exercises and artificial, to know which of them tends to increase flesh and which to lessen it, and not only this but also to proportion exercise to bulk of food, to the constitution of the patient, to the age of the individual, to the season of the year, to the changes of the winds, to the situation of the region in which the patient resides, and to the constitution of the year. A man must observe the rising and setting of the stars, that he may know how to watch for changes and excess in food, drink, wind and the whole universe, from which diseases exist among men.<sup>21</sup>*

possibility of regulating the energy output and intake is first presented In this connection the author considers the air, then the fluid and solid constituents of the diet, and stresses that we are dealing with substance of the universe and of the earth

Under conditions of too much work, there may result too great an increase in bodily warmth—the body becomes hot and too dry, on the other hand, with too great an ingestion of food, catabolism cannot keep pace, waste products accumulate In the discussion of BREATHS, as well as in SACRED DISEASE, the relation of the air and its accumulation, or disturbed distribution, is brought out as an additional and most important fact

The FINAL PART inquires into the problem of environmental factors on individuals of different habitus, and is developed in AIRS, WATERS, PLACES It is shown that organisms, the human as well as the animal, find their most favorable environment in regions where the effect of the sun is most suitable in its effect on the earth In some regions this occurs only at certain seasons Other countries, Egypt, for example, are regarded as unduly fortunate in having such climatic conditions more or less continuously \*

#### GREEK SCIENCE THE INTERRELATION OF THE TEXTS

Surveying the content and style and the general point of view that runs through the various texts and considering the whole on the background of the general knowledge of the 5th century B C, I have formulated an inter-related and integrated sequence of the texts that may possibly be of some use to the reader

Greek mathematics was imported from Egypt and from Mesopotamia and to the extent that pure mathematics can be regarded as science, it might be

\* Hippocrates interest in meteorology and meteoropathology was shared by later Greek scientists Werner Jaeger<sup>22</sup> has but recently discussed at some length the work of Diocles of Carystus

Diocles refined sense of comparative methodology makes him observe at once the essential identity of the nature of such signs in pathology with those signs by which, for example, meteorological observation predicts atmospheric changes and the coming storm This practical meteorology had up to that time been developed mostly by experts of navigation, as Diocles mentions In addition, he mentions some people of many sided experience We think of Peripatetic scientists of encyclopaedic knowledge like Theophrastus who has written a whole treatise on meteorological signs which has been preserved Diocles himself is a meteorologist, as I can prove by a meteorological fragment which I recently discovered and which may belong to his lost book ON FIRE AND AIR So he must have been familiar with the meteorological use of those signs which had been taken over from the old nautic tradition by the modern Peripatetic scientists They adapted this method to their scientific purposes and tried to learn something from it for their philosophical analysis of experience The Peripatetics made use of this sign, for example, in the new discipline of physiognomics about which a treatise has been preserved under the name of Aristotle

asserted that science was imported Thales studied there, as did Pythagoras Even Democritus, who was so close to Hippocrates, spent several years in study in Egypt

But science is something more Interestingly enough, science began with the inquiry of the doctor—as a matter of fact, Hippocrates openly asserted the fact

Hamilton's<sup>22a</sup> discussion is of interest in this connection

In the world of antiquity those who practiced the healing arts were magicians, priests versed in special magic rites The Greeks called their healers *physicians*, which means those versed in the ways of nature Here in brief is an exemplification of the whole trend of the Greek mind, its swing away from antiquity and toward modernity To be versed in the ways of nature means that a man has observed facts and reasoned about them He has used his powers not to escape from the world but to think himself more deeply into it To the Greeks the outside world was real and something more, it was interesting They looked at it attentively and their minds worked upon what they saw This is essentially the scientific method THE GREEKS WERE THE FIRST SCIENTISTS AND ALL SCIENCE GOES BACK TO THEM'

In the year 588 B C Anaximenes was born in the same region that had nurtured Thales He developed the thesis that air was the one constituent of our environment that was of supreme importance—it was the first power I have advisedly used the term developed, because before him the Egyptians held such views The air gods and the sun gods were the chief gods of the Egyptian pantheon as they were of the Greek—Zeus with his thunderbolts, Apollo, his son, who guided the course of the sun, and Asklepios, the son of Apollo

Then followed Anaxagoras Aspasia induced Pericles to invite him to Athens and so the link from Egypt to Athens was completed (464 B C, i e, when Hippocrates was born) At the court of Pericles the influence of Anaxagoras was great in furthering the spirit of free inquiry and in advancing the ideas of Anaximenes So great, indeed, was the repercussion, that he was finally forced to retire when his rational views came into conflict with authoritative tradition In the APOLOGIA, Socrates makes the point that "the books of Anaxagoras of Clazomene are full of such assertions (i e, concerning the significance of the air) which may be purchased for a drachma at most, in the orchestra"

So much for the background

Hippocrates was born the son of a physician of Cos Temple site of Asklepios, health resort to which flowed a constant stream of visitors, half-way station to Rhodes and Phoenicia and Egypt, Cos provided the physical background and the intellectual setting at a time when the avidly curious Greeks had acquired the leisure and wealth that permitted intellectual pursuit

As a boy Hippocrates dissected animals in routine school work (if we can accept Galen's view), clinical experience must have been acquired in all the formative years with his father and grandfather as preceptors

I surmise that he fashioned BREATHS in his student days. Imbued with the doctrine of Anaximenes and Anaxagoras, he applied the concept of the importance of air to the physiological phenomena that came readily to his attention and to simple and common clinical affairs such as headache, chilling, bellyache, hemorrhage from the lungs, fever. It is an essay that one might expect from an alert young mind—in part speculative, but with intuitive insight into basic clinical problems that gave more than the promise of genius.

Then followed his long journeymanhood during which he travelled much of the Greek world. To Egypt, probably, to Libya, the Greek mainland, with long tarrying at Abdera with Democritus. Then the whole Black Sea littoral with its great Greek colonies, of Sicily there is no mention.

In so doing he became more and more interested in the world of fact. In the seas and the land, in wind and weather, in the people and their habits and diets and occupations and folklore, their body form and skin color, and their reactions as they were apparently modified by place and time, by food and water, by custom and habit, by disease or injury.

And after his return, with impressions still vivid (and copious notes) and vision widened, he put into form his great AIRS, WATERS, PLACES—the first of those wholly scientific studies that interpret man in his relation to the universe in which he exists. He wrote it with youthful enthusiasm, clear insight, penetrating analysis and in wholly objective fashion.

Air still comes first! He merely expanded his earlier BREATHS. Of course he was interested in the winds—all voyaging was by boat and one does become weather conscious in a very direct fashion under these conditions. He must have acquired sea lore as well, the tales of the sailors not written on scrolls of parchment. How else would he have described the "*poles of the earth covered with snow and ice*"? The north pole and the south? How would he have known of universal winds, and the milder climates of the islands far offshore? Or of fall winds? And recall if you will, that when described in the text, such knowledge was apparently accepted as a matter of fact—no particular explanation was necessary a half millennium before our era!

After completing AIRS, WATERS, PLACES, he began to put in order some of his case notes. Those from Abdera and Thasos sound absolutely Hippocratic, they reveal study of several years in Thasos, with an epidemic of poliomyelitis, detailed case records, accumulated weather records and the effect of weather on man—much in the fashion followed in a later day by Sydenham in London.

And then he hammered home the story in SACRED DISEASE, where in logical sequence he put together the story of anoxia as it is reflected in the course of disease.

He became a master craftsman. His meticulous description of surgical manipulations, his outlines for diet and regimen, his clear case records are admirable today.

Later he found time to generalize, to approach the wide horizon of the philosopher, to apply concepts of Heracleitus and of his friend Democritus (whose fame has come down to our day in connection with his atomic theory)

Hippocrates had observed organic balance in his clinical material—now he began to discuss it in its theoretical implications. He used the word symbols of the philosophers, symbols such as "Fire" and "Water" or "the road up and the road down"—today we would say anabolism and catabolism. He discussed the law of the conservation of matter as it related to medicine, he fathomed the endlessly complex, though obviously ordered state of the organic world in its resemblance to the ordered matter of the inorganic world. He pictured life as the maintenance of an unstable equilibrium, and disease as a disturbance of this unstable rhythm, saw man as evolved in the course of action and reaction—man as the creation of the elements that fashioned him to be susceptible yet resistant, yielding yet rigid, ever succumbing yet ever renewed.

#### NOTE E—Greek Medicine as *Paideia*

Expressing as it does the reflections of a great Greek scholar, I am, by permission, quoting the introductory paragraph of the third volume of Jaeger's *Paideia*.<sup>22</sup> The keen analysis of Greek medicine presented in the work can, much to my regret, only be referred to in this connection.

"PLATO speaks of doctors and medicine in such high terms that, even if the early medical literature of Greece were entirely lost, we should need no further evidence to infer that, during the late fifth and the fourth centuries before Christ, the social and intellectual prestige of the Greek medical profession was very high indeed. Plato thinks of the doctor as the representative of a highly specialized and refined department of knowledge, and also as the embodiment of a professional code which is rigorous enough to be a perfect model of the proper relation between knowledge and its purpose in practical conduct, and which he constantly cites, to make his readers understand how theoretic knowledge can help to transform the structure of human life. It is no exaggeration to say that Socrates' doctrine of ethical knowledge, on which so many of the arguments in Plato's dialogues turn, would be unthinkable without that model, medical science, to which he so often refers. Of all the branches of human knowledge then existing (including mathematics and natural science) medicine is the most closely akin to the ethical science of Socrates. However, we must examine Greek medicine not simply as a preliminary stage in the intellectual development which led to the philosophy of Socrates, Plato, and Aristotle, but also because it was in the form which it then possessed that it grew into something more than a mere craft, into a leading cultural force in the life of the Greek people. From that time, despite some opposition, medicine became more and more a regular part of general culture (ἐγγύνλιος παιδεία). It has not regained that prestige

in the culture of our time. The highly developed medical science of today, which grew out of the rediscovery of Greco-Roman medical literature during the humanistic era, is too severely specialized to hold the same place as its ancestor."

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## NOTES AND REFERENCES

### CHAPTER I

#### NOTE A—Measure—Individuality and Science

In the biological sciences, particularly in medicine, but also in psychology, we constantly face a conflict between the rigid formalism demanded by the mathematical and statistical approach, and objective observations made on the individual—for medicine and psychology primarily deal with the individual

Hans Much stressed this in his *HIPPOCRATES DER GROSSE* and Allport succinctly states the problem in his *PERSONALITY, A PSYCHOLOGICAL INTERPRETATION* "Why should it be, Allport asks, that science, in essence the epitome of rationality, should part company with common sense over the fact of human individuality? The outstanding characteristic of man is his individuality. He is a unique creation of the forces of nature. Yet, because of his very uniqueness, the sciences regard him as 'somewhat of an embarrassment' when, with brash insouciance, he intrudes his undeniable unpredictability into their several arbitrary and carefully ordered domains. For the goal of all science is the *UNIVERSAL PRINCIPLE*, of which the individual may be an instance or example—but of which, equally, he may be a most brazen contradiction!"

"The newer natural sciences have sought to follow this ideal of the older exact sciences, in order that their disciplines might the sooner meet the rigorous tests of scientific exactitude. But, with the slow maturing of the sciences of biology and psychology, it has become increasingly evident that this 'piling of law upon law' does not in the slightest degree account for the pattern of individuality which each human being enfold. The person evades the traditional scientific approach at every step."

#### NOTE B—The Foehn

The warm, dry winds characteristic of mountainous regions (Alps). They may rush violently from heights to the valleys, and apparently are more powerful in their effect on the human than even ordinary storms. Associated reactions include the feeling of lassitude, depression, anxiety or irritability, intellectual activity is inhibited, there may be restlessness, often the limbs are leaden, headache is common, sensory perceptions are dulled, there may be lessening of inhibitions and with this, great sex irritability.

The so-called *CAPE DOCTOR* of South Africa as well as the *CHINOOK* of our northwest and the *BORA* are related. Hippocrates mentions another and probably similar wind in the land of the Phasians called *CENCHRON*, that was strong, hot, and violent.



The reader will find an excellent discussion of this and related subjects in GEOPSYCHE<sup>30a</sup> and I have touched upon some of the phases in THE PATIENT AND THE WEATHER, Volume I, Part 2, as well as in Volume III

#### NOTE C—Constitution

The term CONSTITUTION has little meaning to most modern physicians. In a general way it involves consideration of the genophase, on the accepted basis of true gene determined hereditary transmission of characters. Tacitly we admit that the environmental conditions during postnatal development will modify them (sickness, nutrition, exercise, mental and physical habitus, etc.) We may possibly consider that these two components (genophase and paraphase) may be modified by conditions of the moment, with lessened or increased "resistance," possibly due to season, fatigue, trauma or nutritional states.

Hippocrates was much more interested in constitution than we are. In modern therapeutic measures we have tools available that can favorably alter acute disturbances, the Greek physician had none, he had to rely wholly on natural and very simple forces. As a result, he was much more aware and better acquainted with constitution.

He, too, knew the genophase: *a phlegmatic parent has a phlegmatic child, a bilious parent a bilious child, a splenetic parent a splenetic child, grey-eyed parents grey-eyed children, squinting parents squinting children, for the seed comes from every part of the body.* There was no doubt of hereditary transmission in the Hippocratic observation, but he came to the conclusion that people, after centuries of common environment, begin to have certain traits in common (as discussed in AIRS, WATERS, PLACES).

*There are many other structural forms, both internal and external, which differ widely from one another with regard to the patient as well as of the healthy subject—such as whether the head be large or small the neck thin or thick, long or short the bowels (belly) long or round the chest and ribs broad or narrow and there are many other things, the differences between which must all be known so that knowledge of the causes of each thing may ensure that the proper precautions are taken* <sup>30b</sup>

Here are clearly outlined the antipodal types in constitution—the broad or pyknic, and the slender or leptosome individual.

Hippocrates used ancient descriptive terms that were derived from association with the season or the land. Thus the *sanguine* (blood) individual (warm, soft and moist) was analogous to the warm and moist character of the land in the spring, the *choleric* (bile) individual was warm and dry, corresponding to the warm and dry land of the summer, the *melancholic* (black bile) individual was cold and dry, corresponding to the colder and drier land of the autumn, while the *phlegmatic* (phlegm) individual was cold and moist, corresponding to the cold and damp land of the winter.

However, when using the term CONSTITUTION as we find it in the Hippocratic texts, a plurality of meanings is involved. First of all there was the strictly PHYSICAL, i.e., the kind of person, this we could consider genetic and, therefore, predetermined, though it could be modified by postnatal effects.

When terms of FUNCTION are turned to, we become aware that "constitution" might be a thing of the moment—that constitutional reactivity can be modified from season to season, from year to year, actually from moment to moment.

Hippocrates meant CONDITION as well as CONSTITUTION. Constitution and condition are inextricably interwoven—interwoven, as Hippocrates also recognized, with the environmental situation of the time—and, since cosmic and terrestrial influences largely govern this condition of the moment, Hippocrates thought in terms of the constitution of the environment (i.e., season, weather, climatic cycle) as well as the constitution of the human.

The true physician of today, like Hippocrates, must evaluate all these factors when he treats his patient.

So, too, there has been confusion concerning the word KATASTASIS. This word, used in a dual sense, mainly designated the character of the disease or its peculiar form, but also it designated the character of the season or the year as it influenced the character of disease.

These terms are used in explaining the causes of infection, as when Hippocrates states that *when a year has a certain character and thereby a certain katastasis, the diseases will have a definite character*.

Today we assume that in the constellation of an epidemic we have to consider (1) the constitution of the individual, including susceptibility or immunity, specific and non-specific, (2) the environmental influences of the time on the host (weather, season, fatigue, etc.), (3) change in the infective agent due either to environmental conditions, to previous host experience, to mutation, etc.

### POLIOMYELITIS

As a specific illustration, Hippocrates records observations made in Thasos, where he describes an epidemic of poliomyelitis.

First the weather of the preceding year is detailed.

*In Thasos a little before and at the season of Arcturus many violent rains with northerly winds. About the equinox until the setting of the Pleiades (beginning of winter) slight, southerly rains. Winter northerly, droughts, cold periods, violent winds, snow. About the equinox very severe storms. Spring northerly droughts, slight rains, periods of cold. About the summer solstice slight showers, periods of great cold until near the Dog Star. After the Dog Star, until Arcturus, hot summer. Great heat, not intermittent but continuous and severe. No rain fell. The Etesian winds blew.*

Then *About Arcturus southerly rains until the equinox*

*In this constitution during winter began paralyses which attacked many, a few of whom quickly died In fact, the disease was generally epidemic In other respects the public health continued good*<sup>30c</sup>

CONSTITUTION is here used in terms of the environmental situation (i.e., the constitution of the weather, season)

*But the good constitution involves strong and well proportioned bodily structure, well ordered intestines, musculature that is not too exuberant, nor flesh that is too dry, colorless skin that is white or dark or pinkish—all these colors must be unmixed—certainly yellow greenish tones or yellow skin or a bluish skin, these are not good signs As far as age is concerned, in children one is apt to have abscesses and glandular nodules but with this, the ability rapidly to free themselves from these disturbances In older children and in the youths these growths are rarer but it takes a longer time for them to disappear In men inflammatory nodules of various kinds do not occur commonly, however, in these cases at these ages we are more apt to have favus and the mysterious deeply growing cancers as well as carbuncles until the sixth decade is well past In old people one rarely sees inflammatory disturbances of this type, but hidden as well as open cancers occur very commonly and to the end of life*<sup>31</sup>

Obviously constitution here means the kind of person, and resistance as influenced by age

But if now we continue reading REGIMEN I<sup>32</sup> *that the finest water and the rarest fire, on being blended together in the human body, produce the most healthy condition for the following reasons—we* moderns are apt to skip to the next chapter, or quickly throw down the text with the terse comment of "rubbish" Should we, as investigators, however, go forward to the statement that *at the greatest changes in the seasons of the year neither is fulfilled to the extreme limit, the water is not fulfilled to the densest limit at the onsets of the water, nor is the fire at the onsets of the fire, whether these be due to alterations in age or to the foods and drinks that comprise diet For both (finest water and rarest fire) can admit the amplest generation and fullness It is the softest and rarest bronze that admits of the most thorough blending and becomes most beautiful, even so it is with the finest water and the rarest fire, when they are blended together Now those who have this nature continue in good health all the time till they are forty years of age, some of them till extreme old age, while such of them as are attacked by some illness after the age of forty do not generally die of it, we shall find even less enlightenment and satisfaction*

But this statement, though phrased in the obscure symbolism of Greek medicine, is still true because founded on sound observation (see the Chapters on Theory)

I trust that the reader will have patience to scan the two contrasting types

A *When the thickest water and the finest fire have been blended in the body, the results are such that we must discern a nature cold and moist. These bodies are more unhealthy in winter than in summer and in spring more than in autumn.*

B *If there be blended the strongest fire and the finest water, the constitution is dry and warm. Such persons fall sick at the onsets of fire and are healthy at the onsets of water. It is at the prime of life, and when the body is stoutest, that these fall sick most. A closely related type is one that consists of a blending of rarest fire and driest water, such a nature is dry and cold, unhealthy in autumn and healthy in spring, autumn and spring denoting approximate periods. At the age of 40 (more or less) they are unhealthy, childhood (and the period just before and afterwards) is the most healthy time.*

Is this all rubbish or is good sound common sense concealed in the background? Let us brush away the old and cryptic word symbols and use plain modern terms.

Hippocrates said there were different constitutional types. First of all, the NORMOSOME (*blended of finest water and rarest fire*). Such an individual is best adapted to the environment, the autonomic swings are not too wide. Even the stress of change of seasons (Spring and Autumn, with undue excursions of the necessary biochemical, endocrine, and nervous reactions) finds no reflection in discomfort, or the precipitation of disease, *for both (finest water and rarest fire) can admit the amplest generation and fullness, i.e., the disturbed equilibrium can be restored to normalcy.*

Then there is the LEPTOSOME, *blended of moistest fire and densest water (moist and warm).* These are not well buffered. The pH falls to low levels in the late winter and spring, and hence such types become ill. Leptosomes are definitely more susceptible in the spring than in the autumn. *The body grows quickly (tall)!*

At the other extreme there is the PYKNIC, *blended of strongest fire and finest water (or rarest fire and water) whose constitution is dry and warm and who becomes ill at the onset of fire (summer) and is healthy at the onset of water (spring). It is at the prime of life and when the body is stoutest that these fall sick most!*

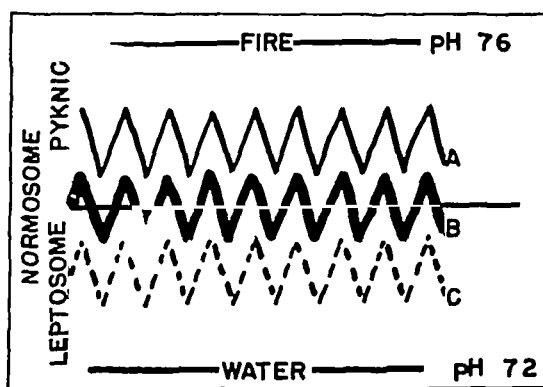
When we identify the types as leptosome and pyknic, it really does not sound as bizarre as at first we might think, because it merely expresses, in archaic word symbols, the ideas that we have today.

That this interpretation is justified is supported by two short but illuminating comments.

The PYKNIC becomes ill in his *prime*, at his *stoutest*, and in the *autumn*. The LEPTOSOME *grows rapidly*, becomes ill in the *spring*.

The PYKNIC and the LEPTOSOME still do!

In its simplest form the validity of the Hippocratic thesis relating the characteristic disturbance of the divergent constitutional types to the character of the seasonal demands (the leptosome disturbed in the spring with the ascendancy of water, the pyknic in the autumn with the ascendancy of fire) can be demonstrated in the psychotic reactions of the different types of individuals. While all clinical manifestations may reveal exacerbations with all kinds of weather, the schizophrenics are more often slender and more often disturbed in the spring. The pyknics are more often broad and more often disturbed in the summer and autumn. The details have been presented in *THE PATIENT AND THE WEATHER*<sup>33</sup>. Frederick Sargent<sup>34</sup> has made corre-



*Text Figure 1 Biotonus Pendulation in Greek Terms, Fire and Water, and in pH Levels of the Blood as modern equivalents*

*A Light Line—the pyknic*

*B Heavy Line—pendulation of the normosome*

*C Dotted Line—relative pendulating levels of the leptosome*

sponding studies in relating the onset of colds in young men of different habitus

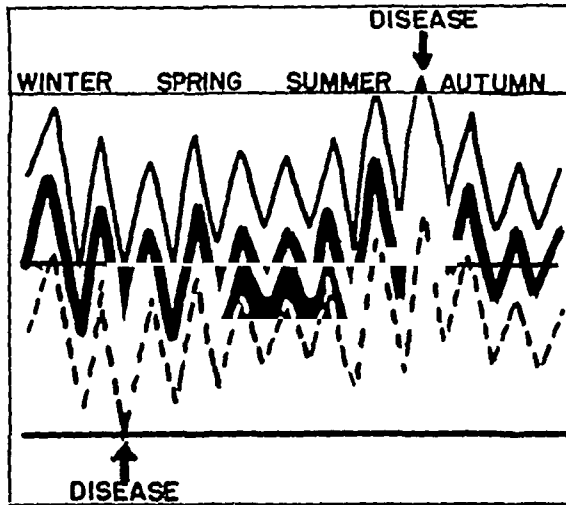
The Hippocratic thesis can be illustrated diagrammatically as in Text Figure 1

In Text Figure 1 the day by day pendulation of the biotonus (here using the Greek concept of FIRE and WATER at divergent poles, or in modern equivalents, the pH level of 72 to 76) is represented

The normosome will range nearer the midline. The pyknic, verging to FIRE, would trend toward a higher pH level and the leptosome, trending to WATER, would reveal a somewhat lower pH range

Placed in a stable environment, as indicated in Figure 1, the amplitude of pendulation would never reach a critical level either toward fire or water (or relative alkalosis or acidosis)

But in the individual living in the region of marked seasonal change and sharply contrasting air masses, as would have occurred in Greece, the amplitude of the organic swing will be very much greater and, as will be observed in Text Figure 2, with the spring the pH levels are pushed down, but are increased in the summer and autumn



*Text Figure 2 The Biotonus Pendulation of the Individual Subjected to Seasonal and Meteorological Change of Greater Amplitude, with Precipitation of Disease at Critical Phases The pyknic is more susceptible at the end of 'fire' (i.e., summer-autumn), the leptosome at the onset of 'water' (i.e., winter-spring)*

Now, under these circumstances, our pyknic and our leptosome may at times reach critical levels, the pyknic reaching 'disease' levels at the time of 'fire' (late summer and autumn), while the leptosome would be more susceptible in the late winter and spring, the time which the Greeks designated as 'water'

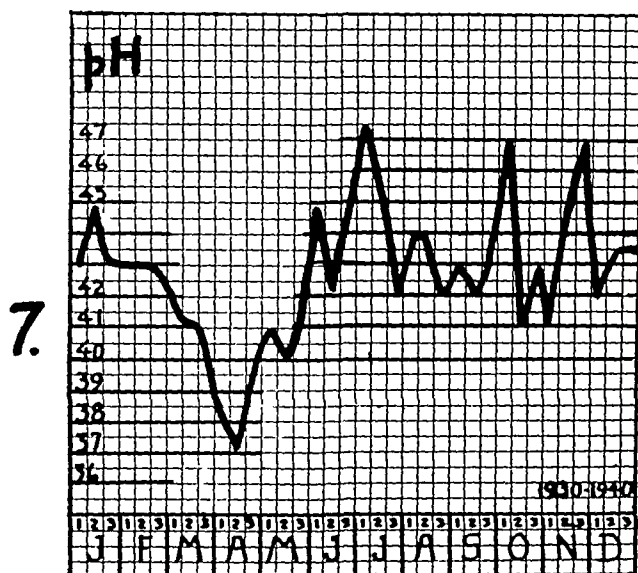
*Such individuals of different habitus (constitutions) might either be well or ill adapted to the seasons, some to summer, some to winter, others again to districts, to periods of life, to modes of living, to the various constitutions of diseases. Periods of life, too, are well or ill adapted to districts, seasons, modes of living, and constitutions and diseases*

*So with the seasons vary modes of living, foods and drinks. In winter, no*

*work is done and foods are ripe and simple—an important point, in autumn work is done, exposure to the sun is beneficial, drinks are frequent and foods varied, with wine and fruits*<sup>35</sup>

#### NOTE D—Spring The Blood pH

Why does the mortality curve reach its crest in the late winter and spring? Why are surgical complications then more common after operations? Why are infections more common? Why do more individuals commit suicide? Why do we have more stillbirths and fewer conceptions? Why do more schizophrenics become disturbed?

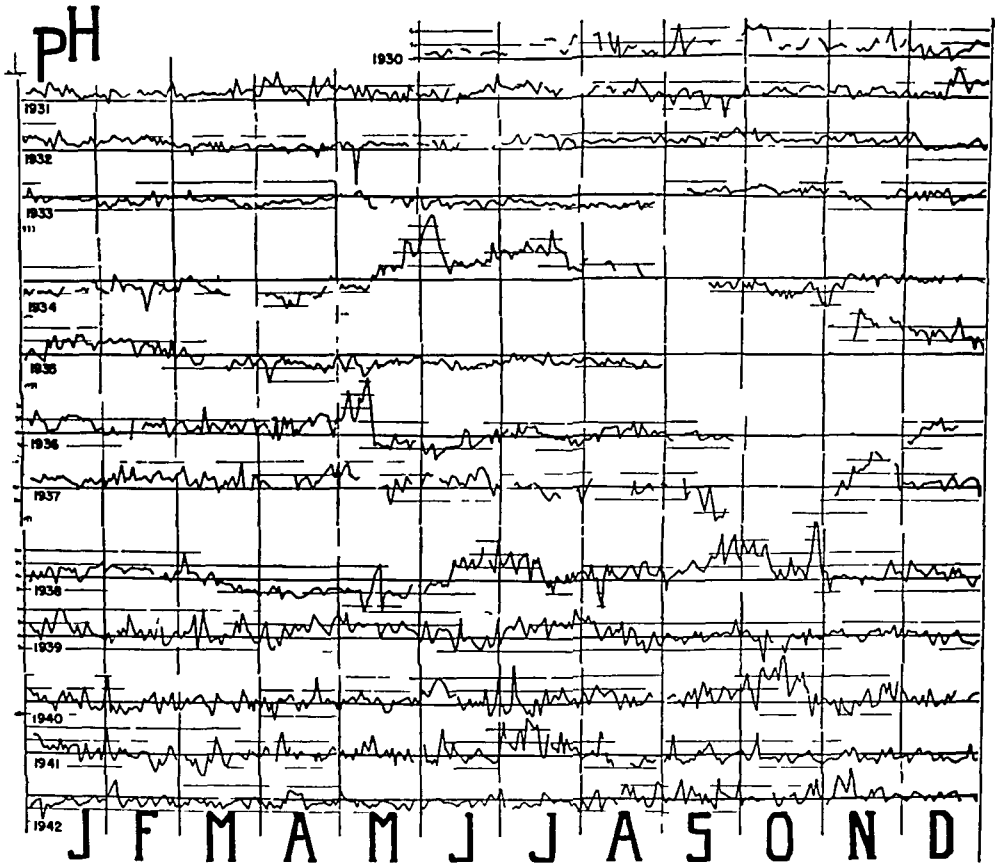


Text Figure 3 Mean Seasonal Trends in pH Levels of the Venous Blood of the Arm, Determined for the Decade 1930 1940 in Day by day Fashion on Normal Individuals, and Patients Ill from Relatively Minor Ailments

The answer is—*exhaustion*, disease is an exaggeration of the state of fatigue. Winter places greater strain on the autonomic mechanisms of adjustment (endocrine, chemical, nervous), on our energy reserves, on our stores of vitamins, on buffers (salts, lipoids), on the rare minerals. Lack of sun light, environmental variability, the lower temperatures, change in diet, change in activity—all play a rôle.

By April a crest is reached, as becomes evident if we follow the seasonal trends of pH levels in the venous blood (Text Figure 3)

At this time the tone of smooth muscle is lessened, blood pressures fall, vessels become more permeable (fatigue), tissue hydration can increase, and infectious processes can spread more rapidly. As reactions verge toward the side of fatigue of the organism, or of the individual organ, disintegration of normally well coordinated functions begins to take place, fluctuations become wide in amplitude and irregular in frequency.



*Text Figure 4 Level of the pH of the Venous Blood of the Arm for the Period 1930-1940, Determined Daily on Normal as Well as Individuals with Relatively Minor Ailments*

When followed in continuous fashion, the pH level gives us some indication of the state of the resistance, but the individual must at all times be considered in the framework of the whole. In this instance we can envisage this by examining the pH levels for the period 1930-1940. No single year is like any other year! (Text Figure 4)



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## NOTES AND REFERENCES

### CHAPTER II

#### NOTE A—The Seat of Disease

*According to my concept of the body there is no beginning, everything is beginning and everything is end, as in a circle This is true of disease and of the body as a whole*

*The dry (solid) portions of the body are involved more in disease than the fluid parts of the body because the disease in the dry part becomes fixed there and continues, whereas those (diseases) that take origin in disturbance of the humours are dissipated, involving first one part and then another and, as they are constantly changing their seat they have periods of intermission and clear earlier because they are not localized \* But when disease is localized in one part it is apt to involve other parts, so, for instance, if it occurs in the body then the head may be involved, and if it occurs in the head then other soft parts and the body may be involved, if it is in the body it may involve all organs For instance, if the gastrointestinal tract cannot properly eliminate and there is resorption and saturation in the body by some of these (toxic) fluids, these may affect the head, either the brain or the meninges Those (toxic) substances, not there absorbed, may again circulate about the body, or localize in some other part and there produce symptoms*

*In order to treat disease we must not only think in terms of the localization which is obvious, but we must treat the organ that is primarily involved Thereby we can best heal the origin of the disturbance<sup>1</sup>*

*If one injures the smallest part of the body, the whole body actually would experience the disturbance for the very simple reason that the very smallest part actually is composed of the same things as the whole and the single part transmits even the smallest impulse, good or bad, to all other parts that are associated, this because the entire body is integrated with the small parts in pain as well as in pleasure, for the smallest parts (units) transmit to related parts and these again pass on the impulse<sup>17</sup>*

#### NOTE B—Migraine

Migraine is the localized expression of an autonomic disturbance that involves the entire organism Bearing this in mind, it can be readily understood that a wide variety of "causes" can initiate the headache, on the other hand, a wide variety of clinical expressions other than the headache may either accompany the headache or become evident as "migraine equivalents"

\* Migraine would come into this category The pain is localized but the attack is initiated by a humoral (autonomic) disturbance The migraine equivalents may be diverse—an arthritis, an asthma, a colitis, a mild jaundice, a palsy, an urticaria, to mention but a few

Since we deal with an autonomic disintegration, all components—vascular (vasomotor), endocrine, biochemical—are concerned and the critical mechanism may be focused about the water balance, the calcium-potassium ratio, the pH level, the pituitary-thyroid-adrenal-gonadal balance. Naturally, individuals of divergent habitus (toward extremes of slenderness or broadness) will be more susceptible, and a distinct familial trend toward the nervous disorders may be ascertained.

Common incitants are rapid changes in environmental temperature (either towards heat or cold) or change in the air mass, endocrine swings (particularly the menstrual cycle), the diurnal cycle and the food cycle, undue physical or emotional disturbances, trauma or infection, allergic states, etc.

When, in association with peripheral vasoconstriction, *the vessels in the head are narrowed*, as Hippocrates stated, a transient anoxia occurs about the smaller vessels in the brain, there is a local release of histamine or histamine like and other capillary active substances, this is followed by hydration and swelling about the smaller vessels. Sensory nerve endings are stimulated, pain is experienced. Severing the nerve tracts relieves the migraine attack but the general and underlying autonomic changes still take place as I have demonstrated.<sup>18</sup>

With the attack the change in the water balance is readily demonstrable and, in addition, the change in the acid-base balance (an early trend toward alkalosis followed by a relative acidosis) may be characteristic. Hippocrates recognized the urinary expression of this when he described the urine as becoming *like that of a beast of burden* (with its turbid, alkaline urine).

I have presented detailed studies of these relations, particularly the integration with the air mass, in *THE PATIENT AND THE WEATHER*, Volume II, etc.

#### CLINICAL ILLUSTRATION

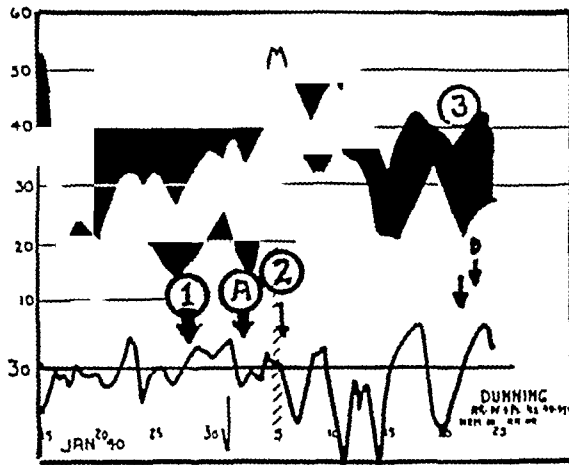
A characteristic history, recently published by Dunning<sup>19</sup> will illustrate clearly many of the points just mentioned.

A woman, 36 years of age, had inherited the tendency to headaches (mother and sister). The patient's headaches began during childhood, prior to menstruation. They occurred two or three times a month, sometimes awaking her at night. Later, after her twenty-fifth year, they came regularly, during or shortly before or after menstruation, and also at other times, were accompanied by nausea, and sometimes by vomiting and lasted as long as two days. The husband stated that the patient is very nervous—she keeps her house like a mirror and is most meticulous. Sometimes she gets so excited, she gets a headache.

The most severe and persistent headache she had ever experienced began at the age of thirty-five years, on *January 28, 1940* (Sunday), (1) in Text Figure 5, when she was awakened by pain in the right side of the head as if somebody was twisting something there and trying to pull it out by the roots. She vomited twice. On the sixth consecutive day of discomfort, which yielded to no medication, she was admitted

to the hospital. Finally analgesic medication seemed to control the headache, food was retained, and she was allowed to sit in a chair forty one hours after admission.

On February 6, the fourth day in the hospital and the second day of menstruation, an unexpected complication occurred. At 6 A.M. she reported (2) having a slight right frontal headache and at 7:45 A.M. went to the bathroom. At 8:10 A.M. a nurse found her standing by the sink and observed cold sweat, dribbling from the mouth, and hemiplegia of the left arm and left side of the face. There was no obvious impairment of consciousness. She had taken a shower and, while bending over to dry her



*Text Figure 5 Meteorogram to Illustrate a Migraine Attack and Cerebral Hemorrhage in Dunning patient. Black field, maximal and minimal temperature for each day, the lower curve, barometric pressure (1) the onset of the severe headache, (A) hospitalization, (2) cerebral hemorrhage, (3) transient headache episode, (D) final discharge. Vertical hatching, menstrual period.*

legs, had felt a 'shooting' pain in the right frontal region just above the hair line, which made her 'dizzy'. She had staggered, struck her left brow against the tile wall, then regained her balance but encountered difficulty in putting on her slippers because of 'numbness' of the left arm. At 10:30 A.M. lumbar puncture was performed, the initial resting pressure was 165 mm. About 18 cc of fluid was collected in eight test tubes, in each of which it was blood tinged to an equal degree. Later, improvement was continuous. Slight pain in the right frontal region, just above the hair line, persisted for nine days. A week later, one of her usual headaches recurred because of annoyance (3). Afterwards the patient vomited, and the pain ceased after analgesic medication.

The meteorogram (Text Figure 5) illustrates an integration with the environment that is both striking and clear-cut.

It will be observed that temperatures had been over 50°F on January 15th. Then followed a sharp decline in the succeeding week. A barometric crest was reached on the 23rd. Such an episode is definitely associated with the conditioning of the patient, the patient usually becoming more susceptible because of the fatigue associated with the relative acidosis.

A secondary polar episode (the patient having been fatigued by the preceding severe cold wave) now appeared, with its crest on the 28th. *This corresponds to the day of the severe headache.* The headache continued and she was admitted to the hospital on February 2nd. Cerebral hemorrhage occurred, (2) in association with the menstrual period and rapidly rising environmental temperatures. A later headache, in a setting of annoyance, (3) occurred at a time of the passage of a pronounced cold air mass with sharp increase in barometric pressure.

#### NOTE C—Urine

The Hippocratic physician was much interested in water metabolism and made careful notes of the character of the urine.

*The urine should be in such quantity that it corresponds to the amount that has been drunk, always uniform, as concentrated as possible, and IN WEIGHT, A LITTLE HEAVIER THAN THE FLUID INGESTED* <sup>20</sup>

He was particularly interested in the precipitates, in change in color, whether it foamed (albumin?)—all of which were of significance when associated with change in the clinical symptomatology.

*The blood-red urine indicates prolonged disease. Cloudy urine occurring at a time of perspiration indicates a relapse. White urine, like the urine of beasts of burden (alkaline) is associated with headache, a pellicled urine, with cramps, a previous period of perspiration is indicated by foam (albumin?) on the surface of the urine* <sup>21</sup>

*But clouds in the urine, which are white and which ultimately sink, are a good sign, red and black and blue-green clouds are of evil portent, as is too urine which has a black precipitate and, which, in itself, is black* <sup>22</sup>

Of significance is the obvious fact that the urinary changes were carefully observed, recorded and correlated with changes in clinical conditions. So, for instance, the observation that the relative change to an alkaline urine (like that of beasts of burden) may be associated with headache. The related swing in the acid-base balance, a factor in the initiation of a headache, finds its reflection in urinary change, and so, too, the change in urinary output, which is so characteristic of migraine and related conditions.

Similarly the change in the character of the urine with sweating. Blood in the urine (red, black, etc.) is frequently noted, as might be anticipated in a region where malaria was prevalent and where acute nephritis and stones were common clinical conditions.

In far advanced cardio-vascular-renal disease, the close association of the

change in the urine and cerebral symptoms was frequently noted, as, for instance, in the following Case History

*Polyphantos in Abdera suffered from headache and violent fever. The urine was thin, copious, had a fuzzy and roughened precipitate. Inasmuch as the headache did not stop on the tenth day, he was given a sternutatory. After this, he got a severe pain in the neck. The urine became deep red and cloudy, as in draft animals. He talked like a patient with meningitis and died with severe convulsions.*

*The servant of Enalkides of Thasos became ill in the same fashion. For a long time she had a urine which was unconcocted, with fuzzy sediment, had severe pain and died with convulsions. The sequence of headache, cramps, and death was associated with this curious urinary change.*<sup>23</sup>

*If there is cessation of urine, with headache, convulsions are apt to occur. So, too, when extremities go to sleep or are paralyzed, there is apt to be severe disease. Observe whether the patients develop mental disturbances as well.*<sup>24</sup>

But these conditions were in turn differentiated from kidney stone or bladder obstruction.

*Cessation of urine, with heaviness in the pudendal region usually indicates dysuria. If this does not occur, then some other bladder disturbance will occur from which the patient has previously suffered.*<sup>25</sup>

*So, too, sudden pain in the kidneys, with cessation of urine, indicates the possibility that there will be urinary sand or a very concentrated urine. In old individuals with fever, such symptoms not infrequently occur when small stones are passed.*<sup>26</sup>

*The patient with bladder stone who puts himself into such a position that the stone doesn't push against the urethra, can urinate easily, but if there is an inflammation about the bladder in the region of the urethra, obstruction of the flow continues under all conditions and in all positions.*

*If there is such obstruction of the urinary bladder and there is much disturbance because of such obstruction and there is fever with this, this is a very dangerous condition. Not infrequently the gastrointestinal tract is partially obstructed. The passage of a purulent urine may relieve the condition.*<sup>27</sup>

*The observation of the close integration of change in the condition of the patient and the urine is made evident in a case history as that of a young man of 20 who excreted a very thin, clear urine. After every meal, he had a bowel movement of thin and bile-free stool, the tongue was roughened, he had fever, was sleepless, and the belly was distended. As far as I know he was mentally disturbed for eight days, talked irrationally, fought with his attendants, and told the most obscene stories—quite contrary to his normal habits. At last, after the urine had been very scanty for a long time, he had a large flow of urine and then slept continuously, perspired freely and seemed to improve, but unfortunately this did not last. This was about the tenth*

day He again became violently disturbed and died on the eleventh day.<sup>28</sup>

There is a note that the secretion of urine with much precipitate relieves mental disturbances, as in the case of Dexittos, after he had lost his hair.<sup>29</sup>

So too, when febrile patients, who have a moist skin, particularly about the head, begin to be restless, the prognosis is bad, particularly if the urine becomes black.<sup>30</sup>

Again change in the urinary flow in association with general conditions is stressed. *Convulsions, associated with continued loss of speech, are portentous, transient loss of speech merely indicates paralysis of the tongue, or the arm or perhaps of the whole right side. Relief in such cases is frequently associated with the unexpected passage of much urine, which may be repeated.*<sup>31</sup>

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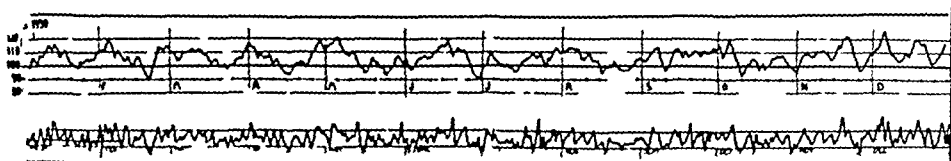
## NOTES AND REFERENCES

### CHAPTER III

#### NOTE A—Cytoplasmic Modification of Genetic Trends

##### THE SEX RATIO OF THE NEWBORN IN THE CITY OF NEW YORK 1939

To illustrate that a physical character, definitely gene determined, may be modified by forces that are not genetic, becomes evident if we merely examine a curve of the sex ratio of newborn babies, as recorded for each day of the year in the metropolitan area of New York, and illustrated for the year 1939 in the form of a curve of the five day moving average. The Text Figure 6 illustrates the interesting pendulation that is evident for the curve swings in cycles, preponderance of femaleness giving way to a preponderance of maleness and vice versa, in a rather definite, positive rhythm



Text Figure 6 New York Sex Ratio (A) Lower curve, day by day sex ratio of the newborn, New York, 1939 Upper curve, five day moving average of the same Note continuous pendulation of this ratio from a low of 0.9 to 1.25

This is not chance, it cannot be wholly genetic

*Males veige to fire*, wrote Hippocrates, *females to water*. In modern terms, males have a higher basal metabolic rate, males are relatively catabolic, females more anabolic. Is it possible that the basal metabolic rate of the population at large, and particularly the milieu of the embryo, in its earliest stage of development, may be swinging in this fashion, so that conceptions that occur at certain times will result in a greater trend to male children or to female children, as the case may be?

The modern geneticist has taken uniformity of the uterine environment for granted, and assumes that organic differentiation proceeds in strictly gene-determined fashion. But let us suppose that the uterine environment is not so stable. For example, suppose that the Hippocratic concept of a continuous pendulation of the organic balance is actually true. Then the egg, with its vast cytoplasmic bulk, may actually be different in its potentials at different

CYTOPLASMIC MODIFICATION OF GENETIC TRENDS by W. F. Petersen and Alvin Mayne, *Journal of American Medical Association*, 121: 929, 1943

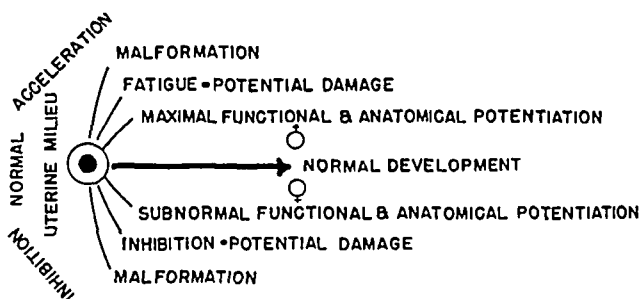


times At some times catabolism may dominate, and the gene train, that might normally induce formation of a female, may be sufficiently disturbed to swing the embryo toward maleness

The modern student is so apt to be overawed by glib generalizations, and impressed by the poundage of clinical records, by microscopic vision, and global embracement, by facts to be memorized rather than to be experienced that it may clear the atmosphere if the validity of the Hippocratic observations is demonstrated

FIRST, that the condition of the mother, reflecting the condition of the environment, will be reflected in the development of the embryo, SECOND, that the transient state of the organism at about the time of conception, having modified the ovum (or the rapidly developing embryo in its critical state) may be reflected in changes that will be permanently fixed in the offspring

We shall represent the possibility in the form of a simple diagram (Text Figure 7)



*Text Figure 7 Possible Modification of Genetic Trends by Diverging Trends in Milieu, with Resulting Modification of Sex, Habitus, Disease Predisposition, and Anatomic Structure*

Starting with a fertilized ovum in a normal tubal or uterine milieu, let us assume that the metabolic gradient may pendulate in either direction from the theoretical norm, and either toward accentuation of function (or metabolic rate) or toward depression. With these two opposite states we will take for granted the involvement of all enzymatic, biochemical and biophysical balances

Genetic potentiation might then be modified, with a greater trend toward maleness, to maximal potentiation of functional and anatomical qualities, through fatigue and finally to malformation or death, with the trend toward the catabolic side, the opposite modification when the trend would be to the anabolic side (Text Figure 7)

NOTE B—The Phasians, tribes living at the eastern end of the Black Sea on the river Phasis (now Rioni), differed considerably from the surrounding tribes. The region has been called COLCHIS since antiquity. Herodotus states that the Phasians, along with the Egyptians, Ethiopians, the Jews were the first to practice circumcision. The pheasant derived its name from the fact that this region was its native habitat.

NOTE C—The Scythians lived on the steppes north and northeast of the Black Sea. Mongoloid nomads, they apparently revealed degenerative trends. It is supposed that they had replaced early Cimmerian (Iranian) tribes.

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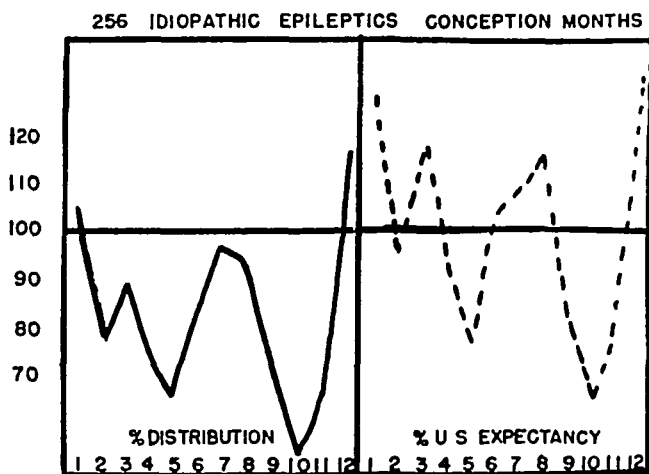
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## NOTES AND REFERENCES

### CHAPTER IV

#### NOTE A—Heredity

*Its origin (epilepsy), like that of other diseases, lies in heredity*, wrote Hippocrates, and there is little doubt that the statement is, in general, true. This, however, does not imply that the epileptic parent has, of necessity, an epileptic child. Electroencephalographic studies reveal a general familial pattern, characteristic of the epileptic, in parents and siblings, though the actual convulsive state need not occur. Studies in heredity (like those of Bassoe, Verschur, etc.) have made evident, too, that in the epileptic background other nervous dysfunctions are common and these include multiple sclerosis, migraine, and neuroses of varied types, the psychoses, etc.



Text Figure 8 Monthly Conception Distribution of 256 Idiopathic Epileptics (from Records of the Institute for Juvenile Research) Curve 1, actual percentage distribution, Curve 2, distribution in terms of United States expectancy

I became interested in the possibility that environmental (weather) impacts, effective at the presumptive time of conception, might be of particular significance, because of the fact that the cephalic pole of the egg is the first to differentiate. *Conception in the coagulation of the seed*—to use the ancient Hippocratic expression—might take the form of an epilepsy.

In *THE PATIENT AND THE WEATHER*<sup>36</sup> evidence has been presented that mental qualities (genius, insanity, feeble-mindedness, personality, etc.) may be conditioned by the season and by the weather at the time of conception.

The idiopathic epileptics apparently belong in the same category. It is probable that the violent blows of the environment (to use Hippocratic language) do affect some modifications of potential functional quality of the cerebral tissues, so that greater susceptibility to undue humoral swings, as suggested by Hippocrates, can later initiate convulsive attacks.

In the preceding discussion of the modification of genetic trends by the condition of the maternal organism (Note A, Chapter III), evidence was presented that weather and season had some relation to such changes.

#### SEASONAL CONCEPTION OF THE EPILEPTIC

To illustrate the distinct differences that exist in the monthly conception distribution of idiopathic epileptics, I have graphed the curve for the conception months of 256 such cases from the records of the Institute for Juvenile Research. The percentage conception distribution by months is indicated in the first curve, in the second curve, the distribution is based on the normal United States expectancy. It will be observed that December and January conceptions provide the larger percentage. A gradual decline occurs from January to a low in October.

We have similar records from other institutional sources.

#### NOTE B—The Physiological Effect of Heat and Cold

*In all these things one must remember that both warmth and cold, as far as applied to the anterior or posterior parts of the body, have their effectiveness through the superficial skin, and inasmuch as this is continuous and inter-related and also related to the vascularization, and since this blood connection passes from the portion of the internal heat (splanchnoperipheral balance) to the outer cold, it is definitely influenced by both warmth and cold, which must be balanced. On the whole, warmth causes pleasanter feeling.*

*The superficial surface of the body, reacting in this fashion, has the ability to react rapidly, first it reacts rather slowly and this irritation is revealed in the blood vessels, in some people more rapidly and in others, more sluggishly.*

*In this way all the reactions occur, not only those in which the superficial skin is cooled, but also when it is heated—particularly the latter, when it is empty of blood, in cases of fainting and related conditions.*

*Naturally the heat follows the blood vessels. Warmth is apparently useful for the lower portion of the belly and other related organs (i.e., the bladder, uterus and exposed portions of the genitals), which organs are naturally cooler than one would expect, because heat goes to the upper portions of the body rather than to the lower. For this reason warmth is to be recommended. It is to be noted that after being warmed, the body is cooled more rapidly because it is more distended, on the other hand, after being cooled, it warms unduly, because it contracts just like water which must be cooled or warmed, and therefore also contracts or expands.*

*Sea water is useful at times, people not accustomed to it should be first anointed with fat For gangrenous wounds and scabbed wounds it is usually not so good, but it is good for clean wounds Usually wounds contract rather definitely and improve, as is observable among fishermen (these do not ulcerate as a rule, if one does not interfere with them)*

*Great cold causes hemorrhage and cough, so too does snow and ice It causes condensation, such as mumps and goitre An accessory factor is the tendency to condensation*<sup>37</sup>

*As a result of cold fluids diffuse from the head when the tissues are tight, the blood vessels are compressed as a result of this, when the tissues are chilled and contract Pressure is then exerted and presses on the blood vessels, squeezes out fluids, and fluid is also pressed from the tissues With this effect the hair becomes erect*

*The fluid so expressed flows to different parts of the body, more or less by chance*

*Fluid disturbance may also occur with undue heat, which loosens the structures of the tissues and expands them, permitting greater diffusion of the fluids which have become thinner (fluids in general become thinner when they are heated) and so fluids pass in whatever direction possible There is of course particular disturbance of the fluids with inflammation, because under these conditions an excess of moisture accumulates When there is such fluid disturbance it continues to flow to such parts until the pressure becomes too great*

*Naturally the parts that are dehydrated take up fluid and actually attract moisture (this is basically the mechanism used to carry out derivative therapy)*<sup>38</sup>

*Pain can occur as the result of cold as well as of warmth, because of the rule of 'too much' or 'too little' In regions of the body that have been cold, pain occurs when they are warmed, on the other hand, when heated and then cooled, pain may occur in dry parts when they become too moist, and in the moist, when they have become too dry Anything that disturbs and distorts the natural condition\* of the body causes pain Healing and improvement occur when the pain is treated by the opposite condition*<sup>39</sup>

*The body of man has in itself blood, phlegm, yellow bile and black bile, these make up the nature of his body, and through these he feels pain or enjoys health Now he enjoys the most perfect health when these elements are duly proportioned to one another in respect of compounding, power and bulk, and when they are perfectly mingled*

\* The relative vascularity of different organs The Hippocratic physician regarded the abdominal organs as warm, other organs as cold—the teeth, the tendons, the organs of the head, and especially the sense organs

*It is interesting to note that when the body is brought into contact with hot water, it can react properly when the body is well, if the effect is too great the body becomes slender*<sup>41</sup>

*Pain is felt when one of these elements is in defect or excess, or is isolated in the body without being compounded with all the others. For when an element is isolated and stands by itself, not only must the place which it left become diseased, but the place where it stands in a flood must, because of the excess, cause pain and distress.*

*In fact when more of an element flows out of a body than is necessary to get rid of superfluity, the emptying causes pain. If, on the other hand, it be to an inward part that the emptying takes place, the man certainly must, according to what has been said, suffer from a double pain, one in the place left, and other in the place flooded.<sup>40</sup>*

#### NOTE C—Multiplicity of Conditioning Factors

While the adjustment to wind and weather loomed large in the Hippocratic mind, he was well aware of the fact that the tendency to convulsions was conditioned by many forces—endocrine (menstrual), diurnal, etc., for instance.

*Apellarios in Larissa was about thirty years of age. He had epilepsy, the attacks came more often in the night than during the daytime, particularly when he slept. He had these approximately two years before his death. Sometimes he would vomit bitter bile on awakening. He was given a sternutatory and after this the attacks did not come for six months. He was a heavy eater.<sup>142</sup>*

Epileptics are characteristically good feeders. Possibly the trend toward an alkalosis, thereby augmented, is a factor in the tendency to convulsive states—fasting (relative acidosis), on the contrary, tends to improve the patient.

*After a long wrestling match he got a severe chill and during the night, fever and epilepsy. The next day he seemed to have recovered, also on the second day, but on the third day, after the evening meal he got his epilepsy and he never recovered consciousness.*

Here the fatal attack was precipitated by unusual exertion, which would bring about a major metabolic swing. Obviously, the local region of the brain had responded with more than the ordinary pathophysiological disturbance that we associate with the epileptic attack (change in the  $\text{CO}_2$  content, etc.).

Hippocrates would have associated the following: *people with epilepsy are more apt to have difficulty and are not often cured if the illness has begun in childhood and has continued into maturity. Those that seem to take origin in the head are the most severe and they are also more apt to improve if there has been no intercurrent hemorrhagic cerebral lesion in connection with the epileptic attack, because such black biliary excitements in the head are not benign.* He also had a rather sensible point of view with regard to epilepsy and old age. Said he: *all those that have their first attack in old age are liable to die, if not, they are apt to recover in a short period of time. Nothing that the doctor can do about it will make much difference anyhow.<sup>143</sup>*

## NOTE D—Shock Therapy

*The son of Anechetos had a similar experience. In the winter he had bathed and sat next the fire anointing himself, while so warmed he fell over in an epileptic attack. When it ceased he looked around but did not immediately regain consciousness. Finally he did, but the next day, early in the morning, he had convulsions, but foamed very little at the mouth. On the third day the tongue was slightly paralyzed. On the fourth day he tried to speak but this was no longer possible. On the fifth day, too, the tongue was very heavy. He had convulsions and again lost consciousness. When this was at an end the power over the tongue gradually returned. On the sixth day he refused all food, after this he had no further convulsions and remained free thereafter (improvement by overcorrection or shock) <sup>44</sup>*

In a monograph published<sup>45</sup> in 1920 I discussed non specific therapy in its various phases, in recent years shock therapy has become a popular method of treatment in a variety of mental disturbances.

Hippocrates summarized the underlying pathophysiological trend, which might result in improvement, as follows: *Anything that can alter (reverse) the organic status of a particular disease condition is a proper method of treatment. Anything that is stronger than the condition that prevails, brings about an alteration. One can bring about an alteration by means of drugs or by means of diet (or by shock). Anything helps the patient which changes the condition. Naturally one cannot use very strong drugs with very sick patients, or merely by decreasing the dose of strong drugs, in order to bring about such an effect <sup>46</sup>*

The following is a characteristic related comment: *Individuals with quartan fever do not develop grand mal, if they have had epilepsy before, they are apt to recover <sup>47</sup>* Intercurrent diseases of various kinds bring about this effect: *epilepsy which has become chronic may be ameliorated when there is pain in the head, distortion of the eyes, blindness, swelling of the testicles or of the breast <sup>48</sup>*

Of course, a general change in the metabolic status such as that associated with puberty, finds recognition in *children who have epilepsy sometimes, as with other diseases, recover at about the time of puberty <sup>49</sup>*

*Epilepsy among the young is cured chiefly by change—change of age, of climate, of place, of mode of life <sup>50</sup>*

*All other abscessions, too, such as fistula, are cured of other diseases. So symptoms that relieve complaints, if they come after their development, prevent the development if they come before.*

*The patient whose right bowel was painful became easier when arthritis supervened, but when this symptom was cured the pains became worse <sup>51</sup>*

Old chronic diseases are cured with great difficulty by comparison to more recent ones. Well, then, we must make fresh diseases out of the old ones. In an old scarred wound one must set up new digestive processes, then bring the

edges together. It is useful to bring about filling, that is, increased metabolism, hydration, etc when one wants wounds to heal. The newly formed tissues that result from a better condition replace necrotic tissues but, of course, this must not be pushed to extremes<sup>52</sup>

Healing involves action contrary to disease, not with the disease. Cold may heal or kill<sup>53</sup>

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## NOTES AND REFERENCES

### CHAPTER V

#### NOTE A—Locus Minoris Resistantiae

Tissues that have been active are more sensitive, due to the fact that the arteriolar and capillary bed may reveal fatigue and will therefore not be able to adjust adequately to the general changes occurring in the organism. Such areas form local areas of lessened resistance and are apt to swell, may provide sites for localization of bacteria, toxins, etc.<sup>43</sup>

*The weakness of the legs which the traveler experiences before becoming ill or at the beginning of the illness is probably caused by the fact that fatigue substances are deposited in the joints and may also affect the muscles of the leg*<sup>44</sup>

#### NOTE B—Greater Resistance of the Female Sex

Women have more reserves (fats, sugar, water, etc.) than men, are relatively anabolic rather than catabolic, and consequently have greater resistance to organic disturbance. They are more resistant to cold, less resistant to heat, they live longer than men.<sup>45</sup>

Individuals in better economic positions have fewer infectious diseases and are naturally more resistant.

#### NOTE C—The Diagnosis of Abdominal Conditions

*The associations of the hypochondrium are extremely important—important to know from which parts they go out, which parts extend and whereto they lead—this is not only important for inflammation of the gut but to determine whether they come from the liver or spleen, etc.*<sup>46</sup>

*When pus accumulates in the peritoneal cavity, we do not have quite the situation that we do in the chest cavity, because it begins to be walled off and abscesses form. It is then rather difficult to recognize it, because even shaking the patient does not give us a clue. When so walled off the pain gives some idea of its localization. If one puts a poultice of fuller's earth or a similar substance over the area the dried part (being hotter) indicates where the abscession is most pronounced.*<sup>47</sup>

*The hypochondrium must be soft and free of pain and uniform on both sides. If there is inflammatory swelling, irregular or painful, the illness is serious.*<sup>48</sup> *Severe bilateral swelling in the hypochondrium, which is hard and sensitive is serious, but if unilateral it is of less danger if it is on the left side. If such disturbance lasts longer than the twentieth day with continued fever, it indicates that there is abscession in the belly. Soft and painless swell-*

*ing in the upper portion of the abdomen usually lasts a much longer period of time and is less dangerous*

*Continued fever, even after sixty days, denoting abscess formation. Similar signs occur with swelling in the hypochondrium that are associated with the gut, only these are less apt to cause abscessions, especially those that are below the navel. These are usually encapsulated, whereas those in the upper region of the abdomen are apt to spread widely. Those are fatal which rupture into the belly, those that rupture toward the outside are much more favorable. Naturally the smaller they are and the more they point toward the outside the more favorable. Those that rupture internally are favorable sometimes if there is no swelling toward the outside and if there is no disturbance or change in color toward the outside. Some of the internal abscessions remain without evidence because of the thickness of the pus.<sup>49</sup>*

*Soft and pain-free swellings in the hypochondrium which readily give way to pressure may bring about crises, but are much less dangerous than inflammatory swellings.<sup>50</sup> And so, too, the distensions on the right side of the belly that give a minor gurgling sound when palpated are not particularly dangerous. In patients where one can palpate a rather circumscribed harder mass below the surface, there one will get suppuration.<sup>51</sup>*

#### NOTE D—The Crisis in Pneumonia

Hippocrates recognized one of the two major factors in the crisis of the pneumonic process, namely, the enzymatic solution of the exudate, evident in the liquefaction (physical signs, as well as sputum), he could not fathom the rôle of the invading organism.

But as we now know that we may have recovery (i.e., bacteriostasis and bacteriolysis in the lung) without all the signs of resolution, so we may have the opposite, that is, resolution may proceed, though the bacteria may persist and may even localize elsewhere. In his observations he notes that recovery might be apparent, though resolution was not yet evident.

#### NOTE E—The Effect on Other Diseases

Because of the broad interest of the Hippocratic physician, trained to observe all phenomena the clinician naturally observed the characteristic terminal pneumonia with which we are so familiar, as well as the effect of a pneumonia in accentuating disease symptomatology due to other organ involvement.

#### NOTES F, G, H—Physical Diagnosis

The Greek physician was excellently trained in physical diagnosis. The friction rub, here mentioned, the succussion sound, the fine râles described in the edematous lung give us at least a little insight into the procedures employed.

Along with this he used his hands and his ears and his tongue, his eyes and his nose—to the best of advantage. From the color of the nails, he ob-

tained insight into the character of the circulation, the cyanosis here mentioned had its obvious implication to the Greek physician, as it would have to us. The foul odor from the lung abscess would indicate an anaerobic and saprophytic invader, with its prognostic implication—Hippocrates drew the same clinical deduction.

#### NOTE I—The Iron Probe

The use of the iron probe and its discoloration gives us an interesting sidelight into primitive chemistry, for the change in color of the surface would give some indication of oxidative or reduction preponderance and might indicate opposite organic states prevailing in tissues or exudates. Iron as well as steel were in common use in Hippocratic times. An excellent study is available in the work of Milne (*Surgical Instruments in Greek and Roman Times*, John Stewart Milne, Oxford, 1907).

#### NOTE J—The Taste of the Sputum

A related approach is that involved in change in the taste of the sputum. A relatively alkaline or a relatively acid sputum would taste differently. For the individual with sensitive and trained taste perception, information so obtained might prove useful in prognosis.

#### NOTE K—Râles

The quotation is of interest not only in bringing into focus the clear differentiation between a non-inflammatory condition, such as edema, and the inflammatory lesions described in this chapter, but in presenting the beautiful comparison of the fine bubbling sound that we can hear on auscultation with the soft boiling of a fermenting fluid.

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## NOTES AND REFERENCES

### CHAPTER VI

#### NOTE A—Fistula

FISTULA IN ANO is frequently associated with tuberculous infection

#### NOTE B—The Crisis

The term 'crisis' in Hippocratic medicine was used to denote any sudden change in the patient's condition, and was usually associated with marked evidence of autonomic, and particularly vasomotor alteration, such as temperature, pulse rate, respiratory rate, sweating or chilling, change in the sensorium, etc. The patient either improves, or very rapidly becomes worse

#### NOTE C—Tuberculous Laryngitis

Laryngeal involvement, early evidenced in slight huskiness, is not infrequently an important sign, ulceration is common in far advanced stages. Intestinal extension follows localization of tubercle bacilli in the lymphatic tissues of the ileum and colon, the source being the sputum that has been swallowed

#### NOTE D—The Mental State

Generally the tuberculous patient is optimistic, the effect on the mental state will depend on the general constitutional makeup of the individual. There is a close association of a tendency to dementia praecox in individuals who are disposed to tuberculosis. Individuals who die from pulmonary tuberculosis or develop dementia praecox are very apt to have been concerned in the spring. (The Cytoplasmic Modification of Genetic Trends—Journal American Medical Association 112: 929, 1943)

#### NOTE E—Habitus

*People with wing like shoulder blades are, because of the weakness of their chest, frequently endangered by hemorrhage after exertion. Whether or not this is expectorated, it is serious*<sup>25</sup>

#### NOTE F—Season

In Chapter I the effect of the season on the pH levels of the blood was indicated. The organic state characterized by lowered blood pH is one with marked lessening of resistance to tissue digestion and with this, tuberculous foci are apt to extend and dissemination can occur, clinical symptoms are exaggerated, subjectively as well as objectively. I have discussed the problem in several papers<sup>26</sup>

## NOTE G—Intestinal Extension

Extension along the course of the gut, particularly the lower ilium and colon. The peritoneum is also not infrequently involved. Hippocrates recognized this *in all patients who have distension of the hypochondrium obstruction of the bowels is serious, especially in long-continued illnesses such as in consumption, and for such as have previously had diarrhea, all consumptive individuals who develop a severe diarrhea die, all patients who have marked distension of the hypogastrium are in bad condition if they are consumptive*<sup>27</sup>

## NOTE H—Therapy

Here are indicated the major therapeutic measures still practiced: rest, the lessening of metabolism, protection, proper food, graded exercise.

## NOTE I—Habitus, Body Surface and the Atmosphere

Consider a drop of water. The very striking thing about it is its shape, a perfect sphere. It assumes the shape of the sphere because the sphere accommodates the largest volume within the compass of the smallest surface area. The proportions of the surface area to the mass are of vast importance, whether for an organic or inorganic particle or for the human, for that matter.

For the droplet of water the pressure of the air molecules, bombarding the water from all sides, compresses the water mass into the shape that it takes. As a result, the spherical form, whether in the water droplet, in an animal cell, or in the human body, provides the least exposure to the environment, i.e., to all the forces of the world in which we live.

But our mass can take another form. We will merely add a trace of adhesive to our droplet of water. Now we can observe it stretch—a long fiber that, in theory at least, could be extended a mile or two or three. At once we have an entirely different physical condition, now an unbelievably great surface area by contrast to the volume contained by that surface. The droplet, or the cell, or the human body will then become more susceptible to the environment, energy impacts will bring about much greater change.

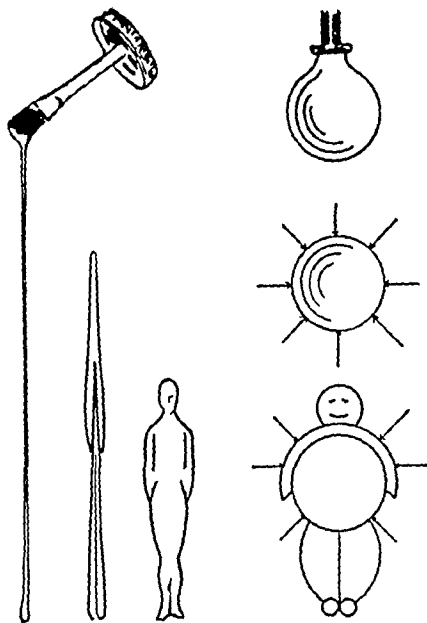
The Text Figure (9) will illustrate the transition and its immediate application to the human form.

It is the pressure of the air molecules against the water molecules that shapes and conditions the water droplet. The interface, i.e., the surface where water and air are in contact, is a zone where a dynamic equilibrium is maintained—where water molecules are leaving the water surface and entering the air and air molecules are entering and dissolving in the water. In such an interchange the temperatures are of major importance.

Air and temperature! Life began in water media. Our complicated organic mechanisms as well as the simpler ones, are built up wholly on such simple

forces and in such simple media water and oxygen, nitrogen and carbon, and above all—indeed very literally above all—sunlight and the energy therefrom derived

We supreme humans still have our body surface (skin and mucous membranes) inclosing a mass of billions of individual cells. The surface area which we present to the world about us is either proportionately large (the slender individual) or proportionately small (the roly-poly, pyknic type)



*Text Figure 9 Relation of Body Surface  
and Body Build*

The air that surrounds us and that bombards our skin and mucous membrane with its millions and millions of molecules—which transmits energy from space beyond, that air is still the most important factor in our environment, for through it come the conditioning temperature forces. Our air, less directly our soil and our water, and, making up the entire background, our sun—these are the forces that govern us individually, as well as in mass. In these days of good clothing and warm houses, of automobiles and sheltering subways, we are very apt to forget the primeval forces, but they still govern our reactions.

The slender types, the leptosomes, being less well buffered, having fewer reserves, and more readily fatigued, are somewhat more susceptible to tuberculosis. See the notes on "Cytoplasmic Modification of Genetic Trends."

## NOTE J—Tuberculosis Mortality in the Female

Even today tuberculosis mortality is higher in the female in the age group from fifteen to thirty (the child-bearing age)

## NOTE K—Hemorrhage

*The consumptive individual who starts with a pulmonary hemorrhage is in greater danger, particularly in those who have marked catarrhal symptoms. The most susceptible age for tuberculosis is between eighteen and thirty-five years of age*<sup>28</sup>

*A normal blood circulation does not cause hemorrhage, this only occurs if there is a coincident change in the vascular dynamics. There are cases in which hemoptysis can be prevented by venesection at the proper time, in other cases it is contraindicated and it is much better to keep all the blood. Venesection must be governed entirely by the time of the year, the pain, and the condition of the humours*<sup>29</sup>

*Patients who vomit frothy blood without pain at the diaphragm are bleeding from the lungs. Those who have ruptured the large lung arteries vomit much blood and are in great danger. If only a small vessel is involved they bring up less blood and are fairly free from danger*<sup>30</sup>

## NOTE L—Tubercles in the Lung

See reference 8, Chapter I, dealing with a discussion of the *hard and unripened tubercles in the lung* in cases of Pott's disease

## NOTE M—Tuberculosis of the Testicle

In addition to these more common and recognized extensions to the bone, the testicle is another favorite site, and skin lesions are common. *Those frequently developed a dry cough who had disease of the testicles and those who have had a cough frequently develop disease in the testicles*<sup>31</sup> *Ragged excoriations of the skin indicate a tendency to consumption*<sup>32</sup>

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| 1 EPIDEMICS III, Case 6            | 12 PLACES IN THE BODY, No 19 |
| 2 JOINTS, Par 41                   | 13 COAN PRENOTIONS, No 427   |
| 3 EPIDEMICS III, No 16             | 14 DISEASES I, No 14         |
| 4 EPIDEMICS III, No 13             | 15 PROGNOSIS II, No 7        |
| 5 APHORISMS V, No 12               | 16 DISEASES II, Chap 50      |
| 6 EPIDEMICS III, No 15             | 17 DISEASES I, Chap 20       |
| 7 EPIDEMICS VI, No 9, 10, 11       | 18 GLANDS, Chap 14           |
| 8 EPIDEMICS VII, No 98             | 19 DISEASES II, Chap 51      |
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## NOTES AND REFERENCES

### CHAPTER VII

NOTE A—Another Patient Who Lived on Broadway (in Chicago—ca 1930 A D )

#### FIRST COMMITMENT

*The diseased state results from powers and from structures, wrote Hippocrates—from the changing restlessness of the winds—from the instability of the humours—from tissues that are inadequate*

The maiden daughter of Theros, a merchant on Broadway, was first admitted to the Psychopathic Hospital of Cook County in the State of Illinois on November 23, 1933



Text Figure 10 Chicago Meteorogram to Illustrate the Weather Conditions at the Time of the First Psychotic Episodes (1), (2), (3)

She was born on December 15, 1912 in Chicago and was of Greek extraction, graduated from high school and had no difficulties with her studies. She was always sensitive, somewhat secretive, repressed and lonely, shy and awkward, she had devoted herself to taking care of her father and herself.

Sometime in the month of August in 1933 she met a drunkard and became infatuated with him. Without encouragement, she frequently wrote and called on him and talked about him constantly.

She began to lose interest in her housework and her personal appearance, and became more and more addicted to day-dreaming. In October of 1933 she was a witness at the marriage of her girl friend and shortly after this became DISTURBED, (1) TWO WEEKS BEFORE HER ADMISSION TO THE PSYCHOPATHIC HOSPITAL. On the Monday before admission (2) she placed chairs on the table instead of dishes, pulled off her clothing and

again, and seemed not to know what she was doing. The next day she was drowsy most of the time, began to talk about her past life. On Wednesday she seemed better but later in the day began throwing shoes at a friend. She was taken to the Psychopathic Hospital on the 23rd of November (3) 1933 and to the Elgin State Hospital on the 6th of December. Here she had periodic attacks of disturbance. (Usually these occurred every month.)

#### THE CONSTITUTION OF THE WEATHER WHEN THE PATIENT BECAME DISTURBED

At this point we interrupt the presentation to examine a meteorogram (Text Figure 10) of the time when the patient was first disturbed.

The curves of the meteorogram indicate the daily maximum and minimum temperature (black field), barometric pressure (heavy line), rainfall (in black columns) at the date line.

First, it should be noted that an unusually warm period existed at the end of October and on the 1st of November. This was followed by a polar episode with its crest on the 20th of November.

It was during this time that the first events recorded in the history episodes (1) and (2), took place, they are indicated on the meteorogram in circled numbers.

#### THE BIOCHEMICAL ALTERATIONS IN OTHER INDIVIDUALS OBSERVED DURING NOVEMBER, 1933

Since the young girl was not under study in 1933, we will turn to a bio meteorogram TF 11 of one of our patients (Arteriosclerotic, The Patient and the Weather, Volume IV, Part 1, pages 517-525) studied in day by-day fashion during November and December of the year 1933. The three episodal dates (November 9, 20 and 23) are indicated on this graph by vertical stippled lines numbered (1), (2) and (3).

The curves of the biogram include the following

- (1) Respiratory Rate
- (2) Morning Temperature
- (3) Methylene Blue Disappearance Time
- (4) and (5) Systolic and Diastolic Blood Pressure Field
- (6) Pulse Rate
- (7) Blood Cholesterol
- (8)  $\text{CO}_2$  Content of the Blood
- (9) Blood pH
- (10) K/Ca Ratio—white line
- (11) Potassium—white columns
- (12) Calcium—black columns
- (13) Serum Protein Concentration

The onset of the disturbance in our patient (1) occurred when in this control patient a BLOOD PRESSURE CREST was evident, associated with an

unusual disturbance in OXIDATION (curve 3), followed by a marked increase in respiratory rate and pulse rate, in blood calcium and in protein concentration. We also note a relatively low  $\text{CO}_2$  content of the blood at the time.

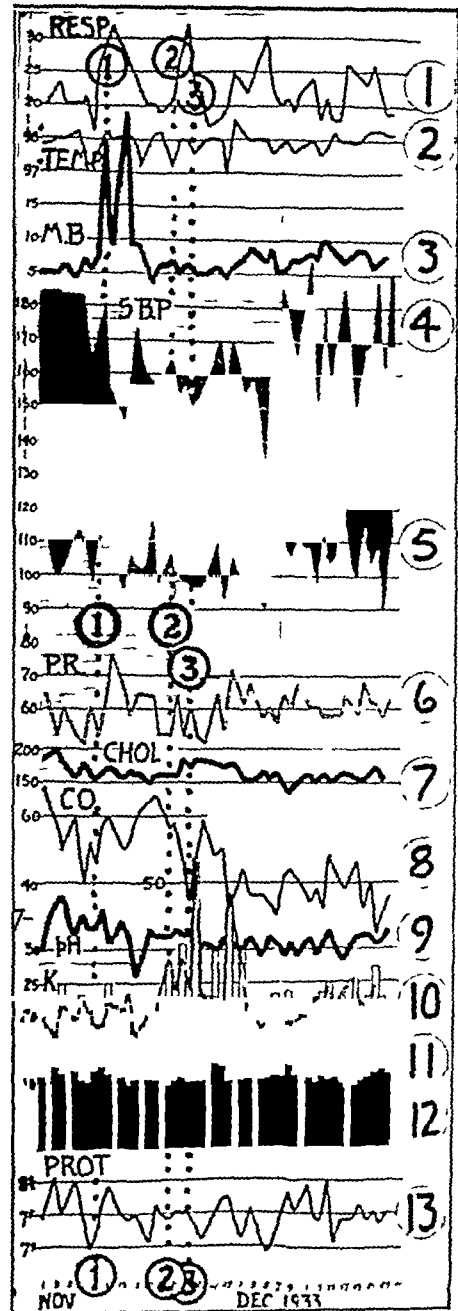
The second episode occurred with a similar biochemical situation. The  $\text{CO}_2$  content and the K/Ca ration revealed a very sharp rise. The respiratory rate was rapidly advancing and blood pressures were unusually low. Note should also be made of the striking increase in the calcium of the blood after this time. When episode (3) occurred in our psychopathic patient this CONTROL PATIENT DEVELOPED A RETINAL THROMBOSIS.

#### PSYCHOPATHIC DISTURBANCE WAS GENERAL AT THIS SAME TIME

Of general interest is the fact that the period when the subject was first disturbed was one of unusual disturbance for the psychopathic population in general (THE PATIENT AND THE WEATHER, Volume III, page 88).

#### THE BODY CHEMISTRY IS SIMILAR IN INDIVIDUALS OF THE GROUP LIVING UNDER SIMILAR ENVIRONMENTAL CONDITIONS

When in a case history such definite dates (November 9, 20, 23, 1933) are mentioned, it becomes evident that such information should be regarded as of more than casual interest.



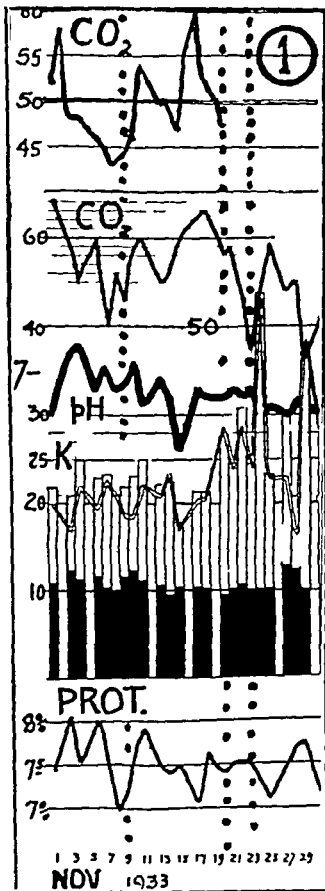
Text Figure 11 Biogram of Control Patient. The three disturbed episodes of our psychopathic patient are indicated on this graph by the vertical dotted lines and numbered (1), (2) and (3).

The time and the place are significant, for time and place involve the entire problem of the **CONDITION** of the patient at that particular time. In general, all individuals of the group are conditioned in a similar way by the environment, but obviously each person will present modifications (menstruation, diet, exercise, trauma, speed of reaction, summation, etc.)

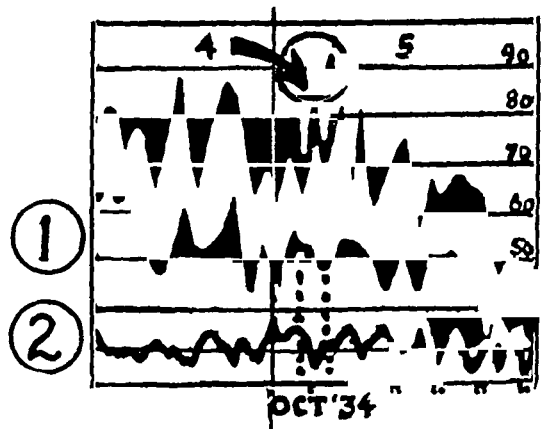
### THE CO<sub>2</sub> CONTENT OF THE BLOOD

To illustrate this we have made use of the biometeorogram for the month of November just examined (Text Figure 12) and over the curve of the CO<sub>2</sub> content of blood have superimposed the curve of the CO<sub>2</sub> content of a psychopathic subject (Subject B, Text Figure 62, Volume III). Our inspection will make it readily apparent that the trends are identical.

The CO<sub>2</sub> content of the blood has much to do in regulating the flow of blood in the brain capillaries. This being true, we can see that if individuals in a group will, because of common weather or other environmental situations, reveal similar biochemical states, their cellular reac-



Text Figure 12 Biometeorogram of Control Subject for November 1933. The CO<sub>2</sub> curve of B (TF 62, THE PATIENT AND THE WEATHER, Vol III) has been added at (1). Note similarity of trends.



Text Figure 13 Meteorogram to Illustrate the Chicago Weather Conditions at the Time of the Second Commitment, Episodes 4 and 5.

(1) The Daily Maximal and Minimal Temperatures

(2) The Barometric Pressure

Arrow #4—Psychotic episode

Arrow #5—Second Commitment to the Psychopathic Hospital

tions, such as those of the brain, will also tend to be similar and, if the organ is defective, will reveal acute clinical episodes simultaneously

### THE SECOND COMMITMENT

She gradually recovered and in June, 1934, was paroled and at that time she was perfectly well. She again kept house for her father but went out very little.

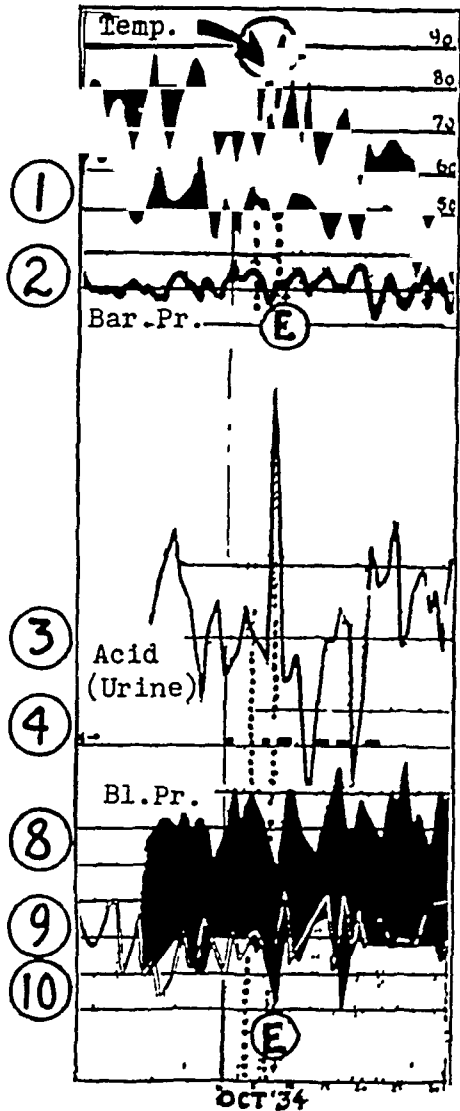
On October 3, 1934, the patient left the house, saying to her father that she was going for a walk (4). She did not return that evening or all night, and the next day was found in a hotel by the police. She stated that she had taken the wrong street car and got lost. All that day she seemed in a daze and made irrational statements. She became more and more disturbed and was turned over to the Psychopathic Hospital on October 7th (5) because her father was unable to take care of her at home. She was transferred to the Psychiatric Institute on October 17, 1934.

The actual onset (4) occurred at a barometric crest, and the accentuation of disturbance (5) followed with a succeeding polar episode. See Text Figure 13.

### THE BIOCHEMISTRY OF A CONTROL SUBJECT AT THE TIME

Again we can demonstrate that when this girl became disturbed on October 4, 1934 (4) and was sent to the Psychopathic Hospital on the (5) 7th, other individuals under study at the time, revealed major disturbances of the biological rhythm.

In Text Figure 14 we shall illustrate this by a biometeorogram of a diabetic patient reproduced from Volume IV, Part 2, Text Figure 107. THE PATIENT AND THE WEATHER.



Text Figure 14. Biometeorogram of Diabetic Subject #5. At (E) this control patient developed retinal thrombosis. The two clinical dates of our psychopathic individual (October 4, when disturbance began, and October 7, when disturbance was accentuated) are indicated by pointers at the top of the graph and by vertical stippled columns. It will be observed that the ONSET of disturbance occurred when this diabetic control subject reached a pressor crest, and ACCENTUATION with a corresponding output of acid, with low diastolic blood pressures (figure reader), together with a loss of the rhythmicity in the control subject.

On the biometeorogram, illustrated in Text Figure 14, the following series of curves are carried

- (1) The maximal and minimal environmental temperature for the period of September 15 to October 31, 1934
- (2) The barometric pressure
- (3) Total acid output of urine
- (4) The presence of albumin in the urine (indicated by black bars)
- (8) and (9) Systolic and diastolic blood pressure
- (10) Pulse Rate

In this control patient, as in our preceding control patient, RETINAL THROMBOSIS OCCURRED AT THE TIME WHEN OUR PSYCHOPATHIC PATIENT WAS ADMITTED for the second time<sup>1</sup> This is indicated by the circled (E)

The two clinical dates are indicated at the downturned pointers and vertical stippled line

We note that with the 7th of the month a maximal increase in urine acidity occurs (following anoxia) and in the wake of this, an unusually low diastolic blood pressure (curve 9)

On the 4th of October there was a pressor crest, but with the 7th, the degree of stimulation was so great that no pressor increase occurred It was replaced by the accentuation of the diastolic low

We now continue the examination of the psychopathic subject

#### DETAILED STUDY—1935

During the course of her stay at the Psychopathic Hospital, we were able to make day-by-day blood pressure determinations These have been graphed, together with a record of the motor and speech activity, the pulse rate and morning temperature (Text Figure 15)

The upper curve indicates the daily maximal and minimal temperature of the time and the heavy black line, the barometric pressure

Days of menstruation have been indicated by cross hatched vertical columns labeled M, the onset indicated by a black dot

Blood pressures have been indicated in the black field the upper line, the systolic blood pressure, the lower line, the diastolic blood pressure, the pulse rate indicated by the white line in the black field

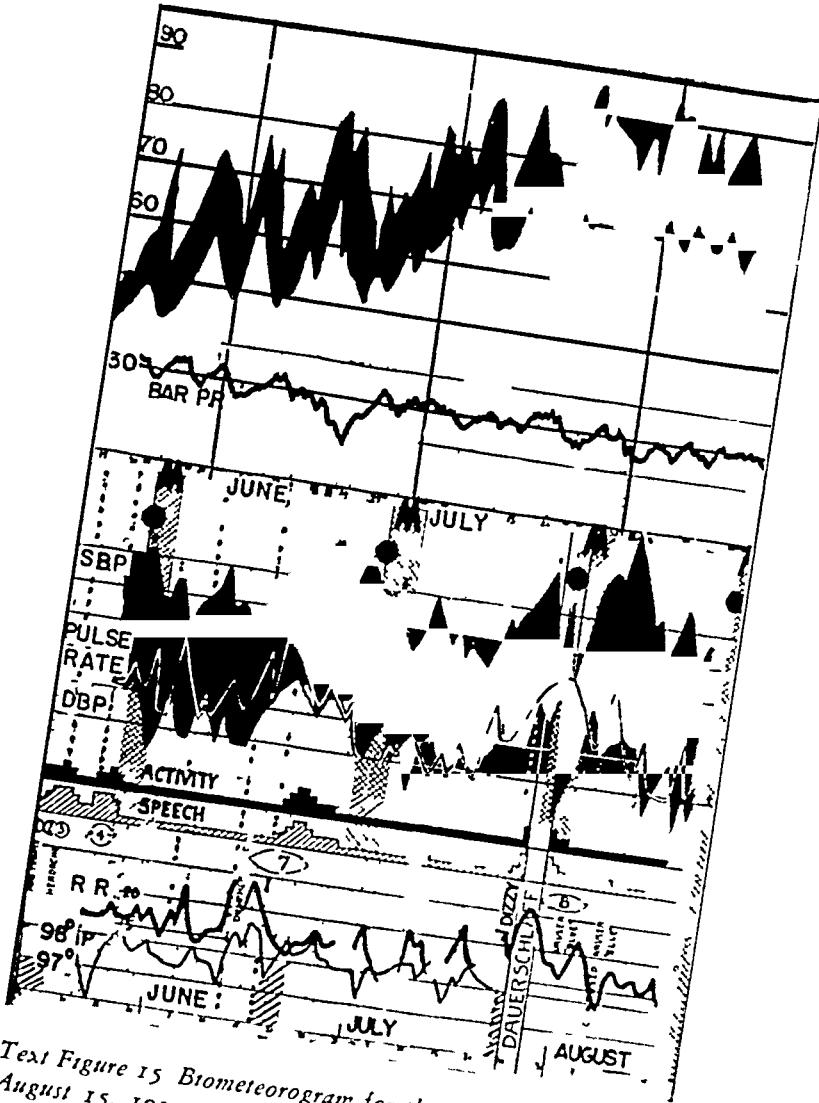
The lower group of curves indicates the respiratory rate and the morning temperature

In a horizontal line above these, the motor activity is indicated and in the cross hatched line, the speech activity

It will be noted that activity (motor, as well as speech) increased at the 14th of May (1—2—3) and again at the 21st of May (4) Another period of activity occurred after the 17th of June (7) and another period after the 22nd of July (8) The menstrual period beginning June 28 was delayed The menstrual dates were as follows

February 22, 1935

March 24, 1935 (30 days)  
 April 25, 1935 (32 days)  
 May 24, 1935 (29 days)



Text Figure 15 Biometeorogram for the Period of May 15 to August 15, 1935 Curves, Daily Max & Min Temp, Bar Pr Systolic Bl Pr Pulse Rate Diastolic Bl Pr Morning Temperature Merstruation Vertical Cross Hatched Columns

June 28, 1935 (35 days)  
 July 27, 1935 (29 days)  
 August 17, 1935 (21 days)

It will be observed that the blood pressures were in general higher



premenstrually, individual pressor crests were related, in addition, to the passage of cold air masses indicated, for example, at the vertical stippled lines between June 12 and 18

Periods of disturbance of the patient were in general associated with periods of higher pressor levels, improvement being associated with lower diastolic blood pressures. While such periods of higher blood pressure were definitely premenstrual, crests were reached coincidentally with the passage of polar air masses

Additional clinical notes indicate (1), that on May 13 the patient had pain in the temples, on May 15 (2) the patient was irritable, on May 16 (3) the patient had a headache and with this motor and speech activity was markedly accentuated. The period was one of unusual cold and higher barometric pressure

On June 13 the patient complained of a headache (6). This occurred with the crest of the blood pressure and was associated with the passage of a polar air mass. Then on June 17 (7), the period of irritability, motor and speech activity recurred. This was premenstrual and in addition was associated with decline from the high environmental temperatures of the 13th and 14th of the month. There was marked precipitation at this time. Blood pressure was unusually high

Episode (8) began on the 23rd of July with an increase in speech activity as well as dizziness. Again it was premenstrual and again this occurred with a pressor crest. The patient was given 'Dauerschlafl' for three days, activity decreasing gradually to the 6th of the month. With falling blood pressures at this time the patient complained of being nauseated as well as 'blue'

Obviously in the genesis of the period of hyperactivity we deal with an anoxia associated with vascular spasm, due, in part, to an endocrine dysharmony, in part to the passage of cold air masses. Clearly the disturbances occurred with increasing blood pressure

## DISCUSSION

We can classify this patient as we wish

She obviously has cerebral tissues that at times are unduly susceptible to change in vascularization and this vascularization depends on many factors. In this instance the endocrine balance is one important component. The weather is another. The season (annual periodicity) is another. We have been able to demonstrate that the initiation of the disturbance was associated with (1) an unusual meteorological period, (2) when other psychotic patients revealed disturbances, (3) when the blood chemistry of other subjects (psychotic as well as non-psychotic) revealed significant alterations, and (4) in two control subjects for purposes of illustration, retinal thrombosis occurred at the time that this patient became disturbed

This simply means that the environmental situation was sufficiently severe to initiate rather unusual organic reactions in other susceptible individuals

Hippocrates stressed that change, howsoever brought about, altered the reaction of the humours and precipitated symptoms (*the diseased state results from powers and from structures*) This detailed study of the daughter of Theros has been presented to demonstrate that such instability of the humours (i.e., the state of the body) is conditioned by weather, is conditioned by menstrual cycles, and by all other energy impacts that bear upon the organism

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- |                        |                        |
|------------------------|------------------------|
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| 2 EPIDEMICS I, Case 12 | 6 EPIDEMICS III, 15    |
| 3 PROGNOSTICS VII      | 7 EPIDEMICS III, 11    |
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## NOTES AND REFERENCES

### CHAPTER VIII

#### NOTE A—Surgery

The healing art began with practical help for the injured. Primitive man had to do something about, he had to use his hands. A broken leg had to be splinted, a dislocated shoulder reduced, bleeding stopped, an arrow extracted. Theory was not necessary, action was.

The Egyptians, Babylonians, as well as the inhabitants of India, developed the crude techniques of early man and had reached a surprisingly capable stage in the art, instruments of the time present clear-cut evidence in this direction, apart from the knowledge that we have derived from Egyptian papyri.

The Greeks followed and improved upon their predecessors, probably the pioneers were not quite as inquisitive as were their Greek successors who always wanted to know the WHY and the WHEREFORE of things that happened.

By the time of Hippocrates, surgical art was on a high plane. Craftsmanship and good technique were important things.

#### NOTE B—Teaching of Anatomy

Galen has this to say on the subject<sup>15</sup>. It may explain the reason.

I do not blame the ancients, who did not write books on anatomical manipulations, for it was superfluous for them to compose such records for themselves or others, while they were, from childhood, exercised by their parents in dissecting, just as familiarly as in writing and reading, so there was no more fear of their forgetting their anatomy than of their forgetting their alphabet. But when grown men, as well as children, were taught, this thorough discipline fell off, and the art being carried out in the family of the Asclepiads, and declining by repeated transmission, books became necessary for the students."

#### NOTE C— "Seven Come Eleven," or Critical Days

Of all the 'exploded theories' of the ancients none seem so absurd as the doctrine of 'CRITICAL DAYS'. The Hippocratic corpus contains several books devoted to the subject: *CRISES*, *CRITICAL DAYS*, *THE NUMBER SEVEN*<sup>\*</sup>—and there are innumerable references scattered throughout the texts.

\* *THE BOOK OF THE NUMBER SEVEN* recently translated by Lommer (in the series edited by Kapferer) is probably Knidian in origin and in several parts it stresses that not only the normal body, but the sick body particularly, is dependent on changes in

How are we to reconcile what we have so far followed—this exhibit of accurate clinical observation and penetrating deduction and comprehension—with the paradoxical interest and attachment of importance to a subject that, in its very nature, savors of superstition?

The Greek philosophers, as their more ancient predecessors, were much interested in celestial phenomena, in astronomy, and in mathematics,—with periodicity and in rhythm, and in numbers which might express such rhythmic phenomena. Organic events appeared to be related in some manner to inorganic events. Faced with the obvious association of the menstrual rhythm with that of the lunar cycle of twenty-eight days, such interest may be regarded as perfectly natural and might merit more than passing curiosity on our part.

The early Greek medical group associated with Pythagorus of Croton stressed the significance of the number seven, Heracleitus emphasized the number thirty, in the Hippocratic texts critical days are frequently mentioned, so, for instance, *acute diseases come to a crisis in fourteen days*<sup>14</sup>

*The fourth day is indicative of the seven, the eighth is the beginning of another week, the eleventh is to be watched, as being the fourth day of the second week, again the seventeenth is to be watched, being the fourth from the fourteenth and the seventh from the eleventh*<sup>17c</sup>

the macrocosmos. Of these influences, seven major environmental phenomena are associated (1) with *transition* from summer to winter, (2) with *changes* in the sky, (3) with the *sun* as a source of energy, (4) with the course of the *moon* with its effect of increase and decrease (i.e., tides), (5) with change in the density of the *air* and its consequences—rain, lightning, thunder, snow, hail, etc., (6) with the *moisture* of the sea and the rivers and the oceans, springs and swamps, and the associated warmth which draws up or precipitates the moisture, (7) with the *earth* itself, with its components as the source of all nourishment—the water and its solutes.

A discussion of this sort is given repeatedly in the Hippocratic texts, as for instance. Seven important cosmic forces are (1) water, (2) earth, (3) air, (4) the moon, (5) the stars, (6) the sun, (7) space<sup>15a</sup>

Seven winds are noted. Apeliotes, the east wind, Boreas, the northeast wind, Arktos from the north, Zephyr, the west wind, Lips, the southwest wind, Notos, the south wind, Euros, the southeast winds which blow periodically and have a seasonal characteristic. So, too, there are seven seasons which have to do with agricultural associations, seven ages of man, seven parts of man, seven vowels, etc.

The reader will find a recent paper by Burr (Burr, H. S., MOON MADNESS, Yale Jr Biol and Med 1944, 16, 249), of interest in that it establishes a definite record of the influence of the moon cycle in electropotentials of trees observed over long periods of time.

<sup>b</sup> The theoretical explanation for the so called *critical days*, as outlined in the fourth book of DISEASES, the NUMBER SEVEN, in HUMOURS, etc., was somewhat as follows.

Ingested food was digested and absorption (of the suitable) and rejection and elimination of the unsuitable occurred within 24 hours. Fluids, on the other hand,

A definite numerical formula was followed. Important is the fact that these critical days were not only fraught with danger but patients might also improve at this time, i.e., the pendulum might swing in either direction. So we read

*Feveris come to a crisis on the same days, both those from which patients recover and those from which they die. The mildest fevers, with the most favorable symptoms, cease on the fourth day or earlier. The most malignant fevers, with the most dangerous symptoms, end fatally on the fourth day or earlier. The first assault of fever ends at this time. None of them, however, can be exactly calculated in whole days, neither can whole days be used to measure the solar year and the lunar month.*<sup>18</sup>

We have to keep in mind that malarial fevers were common and intrusion of a time sequence into medical thinking was logical under the circumstances. Other diseases seemed to have a periodicity of some sort. *In acute pain of the ear, with continuous high fever the patient is likely to become delirious and die. Since this type of illness is treacherous, the doctor must pay sharp attention to all the other symptoms from the very first day. Younger patients die from this disease on the seventh day or even earlier.*<sup>19</sup>

Again Hippocrates stresses periodicity in children. *Most diseases of children reach crisis in forty days, in seven months, in seven years, at the approach of puberty. But such as persist among boys without ceasing at puberty or*

required about three days before they were concentrated properly and eliminated. The critical period was therefore somewhere around three plus one days. If now, because of faulty elimination, stasis in the circuit took place, it caused maximal disturbance in about  $3\frac{1}{2}$  days, because if elimination was not completed by that time, the addition of more would cause damage. Consequently crises might be expected every  $3\frac{1}{2}$  days and multiples thereof. So, for instance, 7 or 11, 17, etc.—These would be regarded as critical periods, Hippocrates himself repeatedly stressed that these were very elastic periods and the periodicity might definitely change with different seasons and different constitutions.

The following are typical excerpts:

*Note that this is an uneven day—the third day—after which the patient can either improve or die. So fever decreases on the irregular days because the body takes up fluids on the even days from the belly.*<sup>20a</sup>

*Wounds too become inflamed on the uneven days.* If the body is heated too much the body loses particularly the tissue fluids, which is most inimical to fevers and on the other hand, the fatty and biliary substances remain, which accentuate fever. It is as though we were trying to evaporate water and oil in an iron kettle and heated it with wood. The water evaporates but the oil and heavier substances are hardly altered, the water, because of its lessened cohesion, is rapidly thinned and as it has become lighter, evaporates. But oils because they are thick and cohesive cannot be evaporated as readily. Just so it is with the human. Tissue fluids are lost to the outside when the body is heated but the biliary substances (toxic) are apt to remain so that the body, if anything, becomes hotter.<sup>20b</sup>

*in the case of girls at the commencement of menstruation, are wont to become chronic Should, however, erysipelas disappear neither on the critical days nor with the formation of an abscess on the exterior, etc*<sup>20</sup>

### THE EXPLANATION

If we accept the close integration of the human and the meteorological environment as developed by Hippocrates, then periodicity in organic reactions (normal, as well as pathological) follows as a logical consequence for if weather changes periodically every  $3\frac{1}{2}$  and 7 days, then human reactions will reflect a corresponding rhythm in activity, in disease symptoms, etc

Weather periodicity has been studied with great interest by Clayton in this country His recently published volumes, *SOLAR RELATIONS TO WEATHER* (Publ by Clayton Weather Service, Canton, Mass 1943) provide a wealth of material Early studies (1893-6) convinced him of the validity of the 6 and 7 day cycle

Some years ago Abbot of the Smithsonian Institute investigated a topic of popular interest, namely, the notion that it rained every Sunday in Washington A statistical study was made which demonstrated a definite  $3\frac{1}{2}$  day rhythm in the inorganic world of the atmosphere circulation, as far as Washington was concerned Bjerknes<sup>21</sup> many years ago called attention to the frequency of the so-called cyclone families, a series of cyclones in increasing or decreasing amplitude passing in a sequence that seemed to be harmonically related

We have no weather records for the period of classical Greece There are available certain historical references to seasonal phenomena, crop failures, isolated storms, but all these are of relatively little value to us

One important record, however, with which we shall deal later, concerns the record of the longest Aurora Borealis ever observed, which occurred (465 B C) near the presumptive time of the birth of Hippocrates (See Note A—Resumption)

We have reason to believe that the climate in Greece in the time of Hippocrates was more turbulent than at present A number of meteorologists and geographers have discussed the subject—Shaw,<sup>22</sup> for instance, as well as Wheeler<sup>23</sup> and Huntington<sup>24</sup>

### PERIODICITY OF THE CYCLONIC CIRCULATION OF THE ATMOSPHERE

The cyclonic circulation of the atmosphere, with its alternation of hot and cold winds, was carefully described by Hippocrates and, only a generation or two later, the term "vortices," i e, cyclones, was actually used in Aristophanes' *CLOUDS*

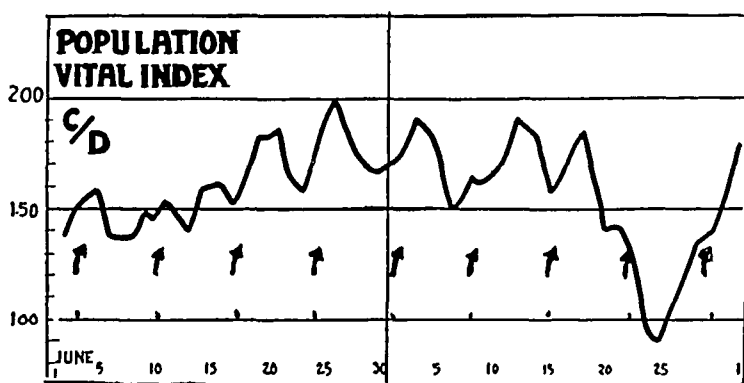
If, as Hippocrates so clearly stated, the state of the body (in other words, "condition of the humours") was conditioned by the winds, and if the cyclonic circulation had a periodicity somewhat of the character and timing such as prevails at present, then the human body might very readily pass

through phases of increasing and decreasing amplitude, involving all the biological balances, and a rhythm of approximately  $3\frac{1}{2}$  days would ultimately lead to the formulation of a timing of clinical events of the nature described by Hippocrates. It would merely represent generalization of actual clinical observations. Incidentally Hippocrates, never dogmatic and always the clinical observer rather than the philosopher, repeatedly stressed that timing of such critical days might be modified by the constitution of the year and by other forces.

Periodicity was by no means to be regarded as absolute.

#### THE PERIODICITY OF THE VITAL INDEX\*

Let us go a step farther. Let us see if there is any real basis for these allusions to "critical days" and "critical seasons" and related periodicity of disease. We turn to a cycle of seven days and examine the Vital Index of the population for Chicago for the period of June and July, 1940.



*Text Figure 16 Population—Vital Index, June and July, 1940, Chicago. Total daily conceptions (back dated 280 days) divided by total daily deaths.*

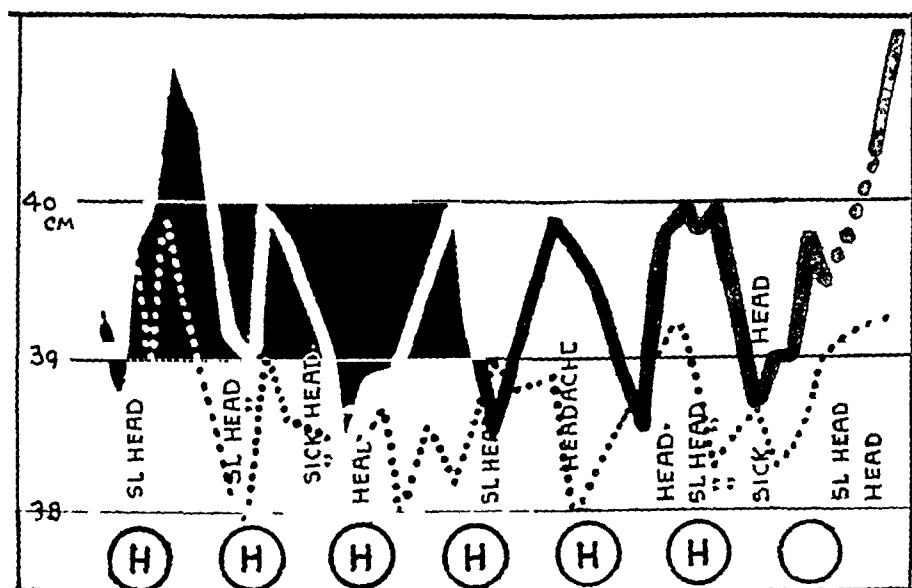
On the graph Mondays have been indicated by upturned arrows. We can definitely observe that each Monday, with one exception, is followed by a sharp and distinct increase in the biological index.

There is nothing mysterious in this. Each such upsurge was associated with the passage of colder air masses at this season. The only exception, namely, on July 23, was the period associated with an unusual heat wave.

\* The seven day rhythm here observed is not an artifact due to lack of Sunday registration of vital statistics. The computation is on an actual examination of records (births as well as deaths) on the date of occurrence, not the date of registration.

NOTE D—Critical Days—An Individual Case Record—(P & W Vol II T F 150)

We turn to a totally different index by merely taking the day-by-day circumference of the knee joints of a patient with hydroarthrosis (Text Figure 17)<sup>25</sup> We note that in one of these knees (the heavy curve) the swelling was more intense than in the other (dotted line). This swelling of the joints is associated with a change in the "humours". When the blood became more acid the joints began to swell, when more alkaline, the joint swelling would recede and the patient usually had a headache\*. While the swelling of the joints is not absolutely synchronous, there is general concordance in the two knees



Text Figure 17 Curve of Joint Circumference (Cm) (Knees) of Autonomically Unstable Female, with Hydroarthrosis, for the period from October 25 to December 15, 1932

Sundays (headache) have been lettered H. There is a definite rhythm with headache occurring at approximately weekly intervals with joint swelling in between. The headache is initiated with an increase in blood pressure and vasoconstriction, particularly in the peripheral and in the cerebral vessels. Following this phase swelling of tissue occurs, as discussed elsewhere. The actual headache may therefore either precede or follow the period of the

\* Hippocrates described a case such as this: *pain in the hips and knees, and attacks of asthma, too, alleviate the headache* (i.e., alternate with the headaches) or *headache may be superimposed on an asthma*<sup>26</sup>



general swelling of the tissues that is associated with swelling of the knees. The entire clinical phenomenon is in turn conditioned by the passage of different air masses, but unless one has this in mind, the rhythm might seem most mysterious.

The background is provided by the meteorobiological rhythm and the various interference phenomena which originate in a host of environmental impacts, endogenous endocrine rhythms, diurnal and habit factors.

The fact that most fevers terminate in two weeks is very likely due to the fact that it takes approximately from ten days to two weeks to develop the maximal immune responses, the organism will react more vigorously (1) either with improvement, or (2) with rapid deterioration when maximal stimulation proceeds to fatigue. Hippocrates specifically recognized this time interval in his statement that *one should be especially on one's guard against the most violent changes of the seasons, and unless compelled one should neither purge, nor apply cauterly or knife to the bowel, before at least ten days are passed*.<sup>27</sup>

#### NOTE E—Circulation

When the patient is in a terminal state, the vessels are apt to be spastic (when the peripheral bed is closed in order to raise general levels) or the peripheral vessels may be dilated and engorged as an after-effect of spasm. As a result a peripheral wound will reveal these extreme states by being either very pale or engorged, and such changes would be of prognostic significance.

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### CHAPTER XI

#### NOTE A—Democritus

Democritus, the greatest of the Greek physical philosophers, was born in ABDERA (in Thrace), sometime between 470 and 460 B C. He studied in Egypt for a period of years (mathematics, physical systems), later, he developed the atomic theory and cosmology. Atoms were eternal and invisible, absolutely small, so small that their size could not be diminished (hence the term INDIVISIBLE). According to Democritus they filled all space, were homogeneous, differing only in figure, arrangement, position, and magnitude. While differing in quantity, their differences in quality were only apparent—due to the impression created on our senses by different configurations and combinations of atoms. As the atoms are eternal and uncaused, so, too, is *motion*. Heracleitus explained everything on a purely mechanical (but not fortuitous) basis, with no idea of Providence or an intelligent cause working with a view to an end. Democritus devoted considerable attention to the structure of the human body and the soul. He considered life as maintained by the inhalation of fresh atoms to replace those lost by exhalation, when respiration (and consequently the supply of atoms) ceases, the result is death.

According to Plutarch, Democritus recognized one god under the form of fiery sphere, the soul of the world. The better life consisted, not in the possession of wealth, but in good humor, a just disposition, and constant tranquillity of the soul, hence, the necessity of avoiding extremes. Too much and too little are alike evils.

Many of the case records that we accept as Hippocratic are related to ABDERA. It is probable that Hippocrates spent considerable time there and so would have come under the influence of Democritus. Cuvier has called Democritus the 'first comparative anatomist' because of his studies in anatomy.

#### NOTE B—The Periods of Advance in Natural Philosophy (Osborn)

##### *General Conception of Nature*

##### Mythological

##### I Period—*Naturalistic*

##### *Divisions of the Schools*

##### The prehistoric traditions

##### The three earliest Schools

##### THE IONIANS

*Thales* (624-548)

*Anaximander* (611-547)

*Anaximenes* (588-524)

*Diogenes* (440- )

##### THE PYTHAGOREANS (580-430)

##### THE ELEATICS

II Period—Earlier Materialistic  
Teleological

- Xenophanes* (576-480)  
*Parmenides* (544- )  
 PHYSICISTS  
*Heraclitus* (535-475)  
*Empedocles* (495-435)  
*Democritus* (450- )  
*Anaxagoras* (500-428)  
*Socrates* (470-399)  
*Plato* (427-347)  
*Aristotle* (384-322)  
 The Peripatetics, or post-  
 Aristotelian School, including  
*Theophrastus*  
*Ptolemy*  
*Herophilus*  
*Erasistratus*  
 I The Stoics  
 II The Epicureans  
   Epicurus (341-270 B C )  
 III The Sceptics  
   I The Eclectics  
     Galen (131-201 A D )

"*Anaximenes* (588-524), found in *an* the cause of all things Air, taking the form of the soul, imparts life, motion, and thought to animals. He introduced the idea of primordial terrestrial slime, a mixture of earth and water, from which, under the influence of the sun's heat, plants, animals and human beings were directly produced—in the abiogenetic fashion.

"*Heraclitus* of Ephesus (535-475) gave the impetus to this advance. He was so profoundly impressed with the CEASELESS REVOLUTIONS IN THE UNIVERSE that he saw in movement the universal law. Everything was perpetually transposed into new shapes. It must not be supposed for a moment that Heraclitus had even a remote notion of the transformation process of life. He was rather a metaphysician than a natural philosopher, and his principal contribution to the Evolution idea was manifestly in his broad view of Nature, as involved in perpetual changes, yet always constituting a uniform whole.

"*Empedocles* of Agrigentum (495-435) took a great stride beyond his predecessors, and may justly be called the father of the *Evolution* idea. He was not only a poet and musician, but made the first observations in *Embryology* which are recorded. Among his first physical principles we find the four elements—fire, air, water, and earth—played upon by two ultimate forces, a combining force, or love, and a separating force, or hate.

'Thus in the ancient teachings of Empedocles, we find the germ of the theory of the Survival of the Fittest, or of Natural Selection. And the absolute

proof that Empedocles' crude hypothesis embodied this world famous thought, is found in passages in Aristotle's *Physics*, in which he refers to Empedocles as having first shown the possibility of the origin of the fittest forms of life through chance rather than through Design

"*Anaxagoras* (500-428 B C ) took a further step According to Plato and Aristotle, this philosopher was the first to attribute adaptations in Nature to Intelligent Design, and was thus the founder of Teleology He also was the first to trace the origin of animals and plants to pre existing germs in the air and ether"<sup>27</sup>

#### NOTE C—The Evolutionists

The following paragraphs, also from Osborn,<sup>\*27</sup> concern the general topic of evolution

"Most obvious is the fact that Greek speculations and suggestions were borrowed and used over and over again (by later authors) as if original, continuity in the lesser ideas which cluster around Evolution being quite as marked as in the main idea "

\*   †   ~   \*   \*

"The Greek natural history literature, from beginning to end, is a continuous source of pleasure and surprise Amid wide differences of opinion as to how far the Greeks actually anticipated later discoveries, the true conclusion is, that they anticipated many of our modern theories by suggestion, thus they carried the Evolution idea well into its suggestive stage, which was so much ground gained for those who took it up in Europe Greek speculations greatly hastened the final result, although, judged by modern scientific standards, they arose mainly as a series of happy conjectures "

\*   †   ‡   †   ‡

' The history of the central Evolution idea before Darwin therefore follows its rise and fall as the broad explanation of the history of life, which we must throw into contrast with the steady rise of the special knowledge of the lesser ideas which centre in it As a whole, it rose among the Greeks, declined with the decay of Greek science, was kept alive by Greek influence in Theology, and fell in the opposition to rationalism "

i   †

"The early Greeks were mainly deductive or a priori in their method Aristotle, coming much later, after methods of thought had been studied,

\* Osborn himself was apparently not familiar with the Hippocratic texts, they have been generally ignored by the biologists on the assumption that, being concerned with medicine, they are of no importance for general problems, in consequence, their interest has been centered in Aristotle

understood and taught induction almost as clearly as Bacon, but he mainly practiced deduction. This was well, for in his period and during his lifetime, few steps in advance could have been made by the safer method, while he unquestionably promoted many great truths deductively."

\* ~ \* ~ \*

"Long before Aristotle, the principle of Syngensis, or formation of the embryo by the union of elements from both parents, was rightly understood by Empedocles. The notion of hereditary transmission of characters was extremely ancient, and was naturally founded upon the early observed likeness of offspring to parents."

\* ~ \*

"Never has the influence of Nature upon thought been more evident than in the philosophy and natural history of the Greeks. Whatever they may have drawn from the vague, abstract notions of development and transformation of Asiatic philosophers, they certainly recast into comparatively modern Evolutionism."

\* ~ \*

"Their earliest known philosophy was a philosophy of Nature, of the origin and causes of the Universe. As Zeller observes, they aimed directly at a theory before considering the severe conditions required for the attainment of scientific knowledge. How, then, can we explain the nearness of their easy guesses at the secrets of Nature to the results of modern labor? Only through this influence of the 'milieu' of their physical surrounding upon their thought. It is in the environment of the sea we find the inspiration of Greek biological prophecy."

\* ~ \* ~ \*

Even the early Greek natural philosophy sprang more or less from observation, and therefore had some concrete value. It was not wholly imaginative.

"The spirit of the Greeks was vigorous and hopeful. Not pausing to test their theories by research, they did not suffer the disappointments and delays which come from our own efforts to wrest truths from Nature. Combined with great freedom and wide range of ideas, independence of thought, and tendencies to rapid generalization, they had genuine gifts of scientific deduction, which enabled them to reach truth, as it were, by inspiration."

\* ~ \* ~ \*

NOTE D—The Law of the Conservation of Energy

Julius Robert Mayer, as a young man, made a simple observation of the sort that we find throughout the Hippocratic texts. While serving in the

Dutch East Indies as a ship's doctor, he observed that the venous blood drawn from the arm appeared to be much redder than similar blood drawn in Europe. This led him to the conclusion that, with increased temperatures, the amount of energy needed by the body was less and from this stemmed the formulation of a clear-cut law of the conservation of energy <sup>28</sup>

#### NOTE E—Harmony—Music and Organic Rhythm

*(First there must be an instrument of music, whereby to set forth what is intended.) From the same notes come musical compositions that are not the same, from the high and from the low, which are alike in name but not alike in sound. Those that are most diverse make the best harmony, those that are least diverse make the worst. If a musician composed a piece all on one note it would fail to please. It is the greatest changes and the most varied that please the most.*

*Cooks prepare for men dishes of ingredients that disagree while agreeing, mixing together things of all sorts, from things that are the same, things that are not the same, to be food and drink for a man. If the cook make all alike there is no pleasure in it, it would not be right either if he were to compound all things in one dish. The notes struck while playing music are some high, some low. The tongue copies music in distinguishing, of the things that touch it, the sweet and the acid, the discordant from the concordant. If notes are struck high and low, and it is well neither when the high notes are struck low nor when the low notes are struck high. When the tongue is well in tune the concord pleases, but there is pain when the tongue is out of tune <sup>29</sup>*

A musical analogy is drawn when Hippocrates discusses the manner in which nutriment passes the gastrointestinal tract to enter the tissues and to find its proper place in the structure of the body. *Each keeps the same position until nourishment no longer receives it, and it has not sufficient room for the greatest possible extension. For each separates first, and at the same time also commingles. And if, on changing position, they achieve a correct attunement, which has three harmonic proportionals, covering altogether the octave, they live and grow by the same things as they did before. But if they do not achieve the attunement, and the low harmonize not with the high in the interval of the fourth, of the fifth, or in the octave, then the failure of one makes the whole scale of no value as there can be no consonance, but they change from the greater to the less before their destiny. The reason is they know not what they do <sup>30</sup>*

Many years later Karl von Baer used a similar analogy in comparing the harmony of the musical symphony with the harmonic integration which is the symphony of life.

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## NOTES AND REFERENCES

### CHAPTER XII

#### NOTE A—The Microcosmos

*The belly is made the greatest, a steward for dry water and moist, to give to all and to take from all, having the power to see birds and creatures suited to it, destroyer of those not suited*

*And around it a concretion of cold water and moist, a passage for cold breaths and warm, a copy of the earth, which alters all things which fall into it*

*The abdominal organs, like the earth, are the most important, they accept all nutriment, assimilating the suitable or rejecting the unsuitable—a power like that of the sea (water) which is a natural medium for the creatures which inhabit it but injurious when humans drink it*<sup>18</sup>

*About this abdomen the thorax (like the atmosphere) with its passages for cold (inspired) breaths and warm (exhaled), both thorax and abdomen much like the earth, altering all things that fall into it (seed on the one hand, decaying vegetable matter on the other)*<sup>19</sup>

#### NOTE B—The Constitution of the Day

The reaction of the human group to the air mass in which we live is generally alike, although each and every individual has modifications in the amplitude of the rhythmic swing that will depend on age and sex, on previous experience, or diet, on the degree of exposure or the adequacy of shelter. In its simplest form this reactive sequence can be illustrated in Fig. 18.

We picture merely the systolic and diastolic blood pressure levels for a series of days when some energy impact has to be met—be it cold, an infection, an injury, an emotional upset. Immediately the body sets out to shut itself off from the harmful world about it. Constricting substances, are poured into the circulation from the glands (pituitary, adrenal, etc.) and the skin vessels, the cerebral vessels, the pelvic vessels contract. Better insulation thus results. Naturally with this constriction of the vessel coats, the general level of the blood pressure rises, sugar spills from the liver, cells are less permeable, cholesterol enters the cell membrane, for the time being there is less breakdown of the cells. With all this, resistance is enhanced—not only to the cold, but even to such a thing as an electrical current, or to injury in general.

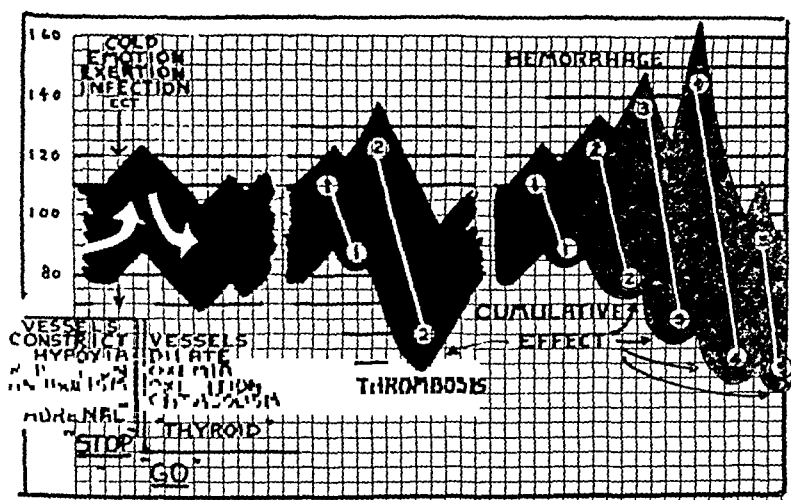
In some individuals we can observe the pallor in the skin vessels, other individuals may even faint if the circulation of the cortex of the brain is diminished sufficiently. That procedure stops conscious reactions the while

the more primitive reactions of the body may go on Under certain circumstances such a mechanism has its merits

Emotionally conditioned vascular arrangements tend to be transient, the reactions that are more prolonged are more often due to cold

But nature never lets the balance swing too far too long Compensatory mechanisms step in to restore the equilibrium Every organic process is made up of a series of wave-like efforts that maintain an unstable equilibrium

The very constriction of the blood vessels in large areas of the body, involving tissue areas operating under duress, means that the cells, as the oxygen



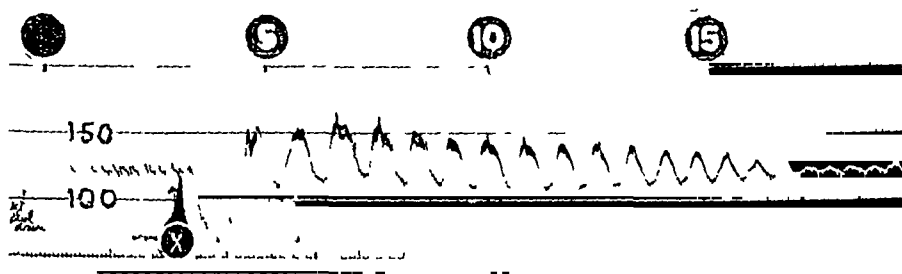
Text Figure 18 Diagram to Illustrate Environmental Impacts on Blood Pressure with Resulting "Stop" and "Go" Phases Amplification of impulses indicated at 1-2 and 1-2-3-4-5, with cumulative effects

supply becomes scanty, proceed to do something about it Air hunger is the one thing that the simplest cell must take note of, because without oxygen it will perish It can struggle violently, this may take the form of movement or an increased change in some other function or activity, most often the production of substances that will dilate the blood vessels The cell may proceed to shift its chemical economy into a different groove, getting energy from sugar by a simple bypass mechanism Or it may put its energy demands into a lower gear, reducing the metabolic plane of its existence

Even we can still make use of some or all of these mechanisms, but for ordinary purposes, the immediate reaction is one of the former types The individual cells do something in the way of protest, they produce capillary-active substances (these involve the increased production of carbon dioxide, lactic acid, histamine-like substances, intermediary acid products of altered

fat metabolism, etc ) The upshot is a complete reversal of the former organic trend The blood pressure begins to decline while the metabolism of the organism increases, the cells become more permeable, more acids are excreted, cholesterol is released and enters in larger amounts into the blood stream

All this would be simple enough in the ordinary course of adjustment to cold and weather and the many other environmental effectors with which we must deal, were it not for one disturbing fact We do not always have sufficient time to recover our balance before the next blow comes<sup>1</sup> Hippocrates said that it took about ten days to recover from a weather disturbance that was severe in character and I am inclined to agree with him



*Text Figure 19 Blood Pressure of Normal Dog Showing Injection of Pitressin at (X) Time indicated in minutes Note wide swings in amplitude followed by gradual return to normal equilibrium*

If the body must meet such situations too frequently, if they are too severe, or if the organism is too sensitive, is poorly protected or has insufficient reserves, then violent swings occur in the chemical balance as the organism seeks to maintain an equilibrium Blood pressure may go too high or too low, the acid-base balance may swing from highs to extreme lows, the calcium and the potassium level gyrate in wide excursions, cell fluid pendulate from states of extreme hydration to dehydration

NOTE C—See Note C, Chapter I

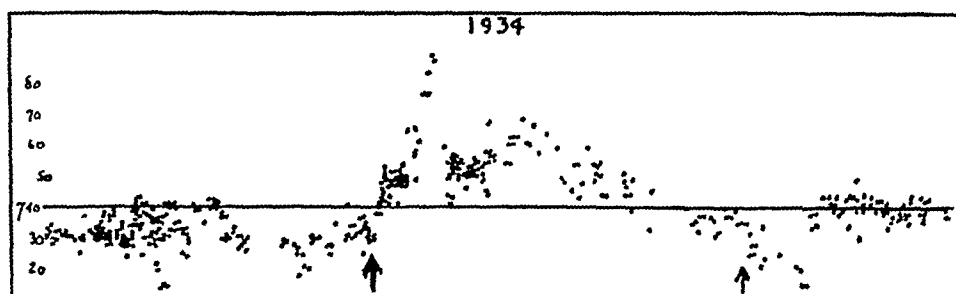
NOTE D—The Unstable Organic Equilibrium

Before considering the involved clinical demonstration included in this note I shall merely illustrate that ANY IMPACT on the organism initiates a disturbance of equilibrium that is represented by a wave motion of decreasing (at times increasing) amplitude, with final restoration of a normal balance

In the experiment of Dr Nedzel illustrated by Text Figure 19, pitressin was injected intravenously into a dog at the point (X) and blood pressures were then followed for a twenty minute period The first effect of the injection caused a severe contraction of the myocardium with practical inhibition

of motion for a minute. Then followed a characteristic wave motion of increasing and decreasing amplitude of blood pressure.

Actually, not one, but an almost unlimited number and variety of environmental impacts at all times effect the organism. The rhythm set up by any one may augment or negate others, depending on phase and time.



Text Figure 20 pH Levels of a Population Group—1934

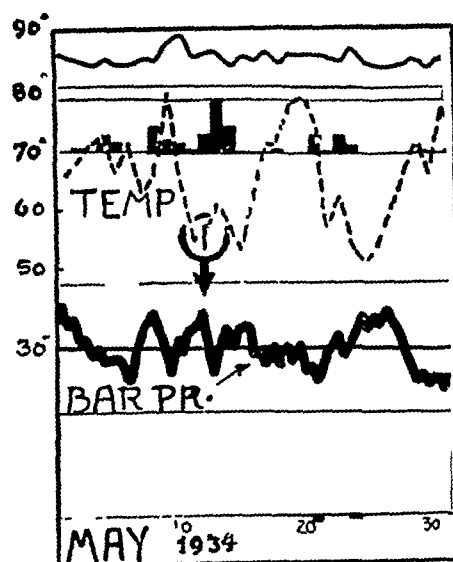
Arrow (1) Date of May 12, 1934 (onset)

Arrow (2) Date of October 17, 1934 (admission to the Cook County Hospital)

#### A PATIENT WITH TUBERCULOSIS

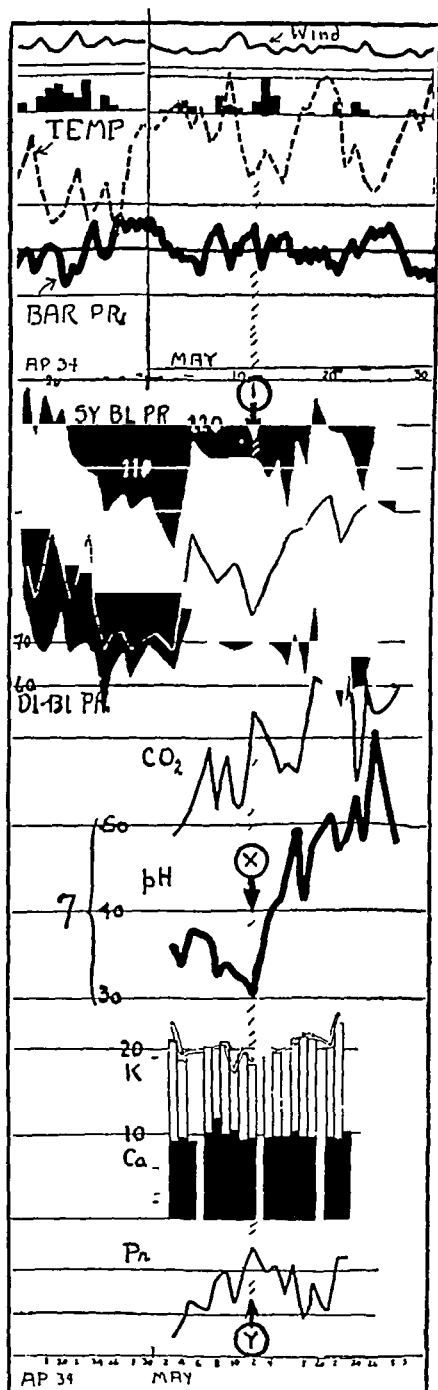
We turn now to a patient who entered the Cook County Hospital on October 17, 1934 (a complete study has been published elsewhere<sup>20</sup>), with a history that about May 12 he had developed fever, with pain in the right chest anteriorly (worse on deep breathing and coughing). He was admitted with a diagnosis of pneumonia. He had tuberculosis of the lung. This apparently first came to clinical attention at Christmas, 1933.

When we examine the "constitution" of the year 1934, as reflected in the blood pH of a series of individuals observed in day-by-day sequence, TF 20, we note that the pH levels revealed a continuation of lows to the time of May 12, indicated by arrow 1. Buffers had been exhausted by the winter, human organisms were hydrated, fatigued, and more susceptible to infection.



Text Figure 21 Meteorogram to Illustrate the Weather at the Time of Presumptive Onset, May 12, 1934

Mean temperature levels—dotted line, heavy trace—barometric pressure. Circled arrow indicates May 12. Note sharp fall in environmental temperatures with barometric crests.



At the particular time in May indicated by the patient, a series of polar air masses passed over the city and the date is indicated (1) on the meteorogram (Text Figure 21) in which the dotted line indicates the mean temperature, the heavy line below, the barometric pressure

Now we will see what changes occurred in a relatively NORMAL INDIVIDUAL (headache subject) observed under ordinary hospital conditions during this period of April and May, 1934 (Text Figure 22)

The same meteorogram is superimposed, and the date of May 12 is indicated by the vertical line with the circled 1. On this date this particular control individual reveals the LOWEST pH LEVEL (X) and the MAXIMAL PROTEIN CONCENTRATION (Y). In other words, blood vessels were more permeable, tissues were hydrated, buffers at a low point and the tissues either stimulated, or verging on fatigue

These changes—the result of weather and season—lessen the

*Text Figure 22 Biometeorogram Illustrating Condition of Control Subject During April and May 1934*

*Upper curves—meteorogram followed by systolic and diastolic blood pressure (pulse rate in white trace), CO<sub>2</sub> content, pH of the venous blood of the arm, black columns—calcium, white columns—potassium, lowest curve—blood protein*

*Circled (1) indicates low pH level, (X) and (Y) high protein content*

resistance of the organism to infection. If a tuberculous infection has been established, extension and activation is enhanced.

*The tuberculous patient* here under consideration, was studied in day-by-day sequence by Drs. Howe and Milliken from November, 1935 to the time of his death in August, 1936.

A complete graph has been prepared and is herewith reproduced. It presents a superimposed meteorogram (1) and curves of the various and varied determinations (bioelectrical, clinical, chemical, cellular, etc.) made as are indicated below (Text Figure 23).

It illustrates the fact that the unstable equilibrium postulated by Hippocrates on the basis of clinical observations, can be observed IN EVERY REACTION STUDIED. Secondly, that the undue cold winter of 1936 (arrows A and B) was associated with a sharp decline in pH levels (curve 8) which, though artificially counteracted by citrate administration, reached a final low level at the end of May (E and F), at which time final exacerbation of the disease became evident (see the sputum curve (19) and curve of electrical resistance (17), decline of the tuberculin reaction (16), etc.) Death occurred at G.

But the final meteorological shift which terminated the life of the individual (the decline in temperatures from a high of 102°F on July 10, to a low of 58°F on July 31st) initiated a change in a control subject which *started improvement!*

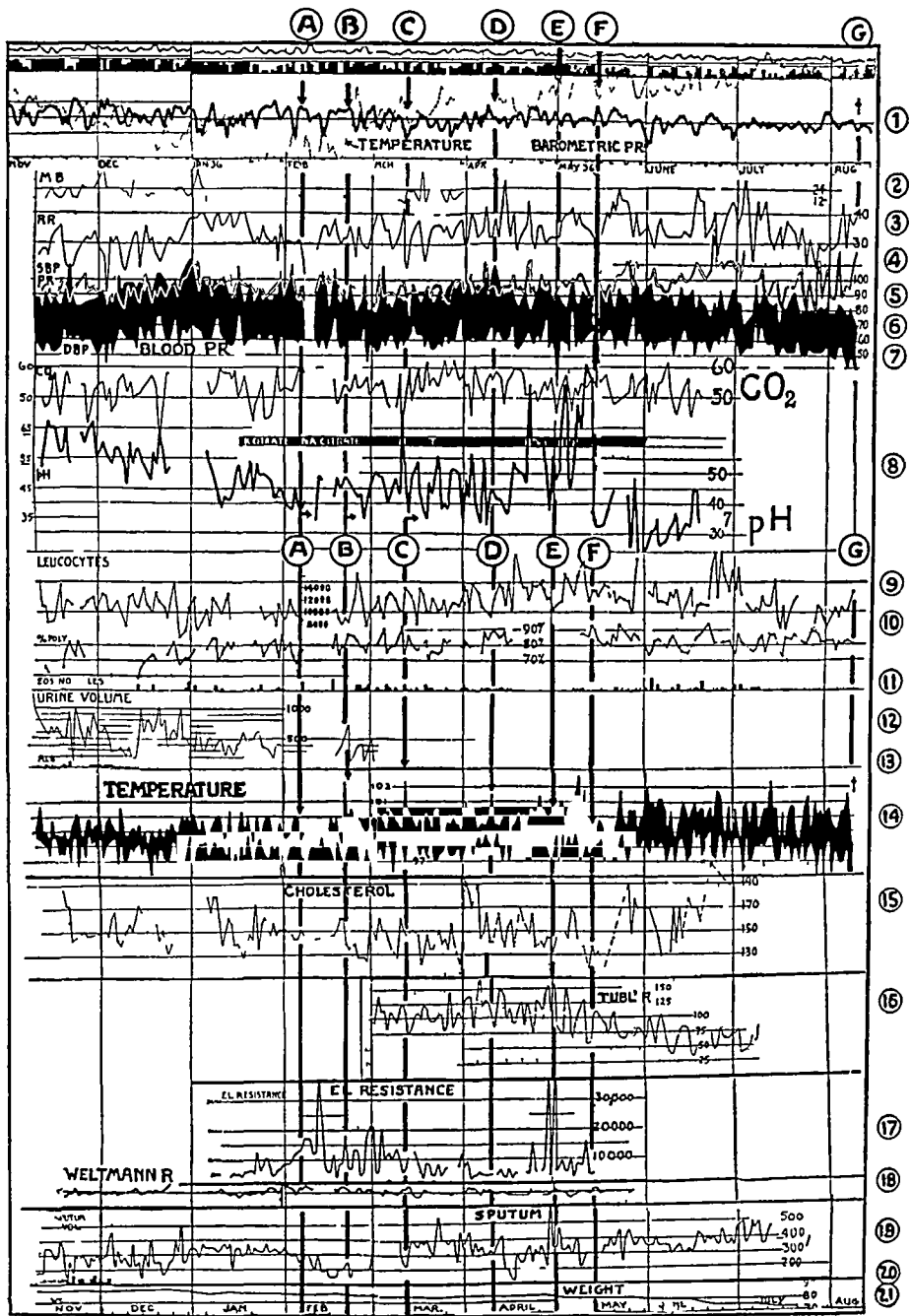
These observations have been presented to make evident the fact that the Hippocratic observations are still valid. The constitution of the year and of the season, and the character of the day change the humours and so makes the individual more or less susceptible.

The organism maintains its existence by means of an unstable equilibrium that involves all biochemical and biophysical processes—adapting to every environmental impact. The wide excursion may come to consciousness as definite organ dysfunction or disease, or become evident in the domain of minor autonomic imbalance.

Since the definite precipitation of the episodes is largely conditioned by environmental impacts (weather), many individuals in the population will reveal changes at the same time and in this way "critical days" become evident, when one patient may die (as here illustrated) or another begin to improve (as in the control case here cited). All of which merely illustrates that accurate clinical observations may, even in this day of detailed science, provide the strongest and most useful foundation for medical knowledge.

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| 2 HERACLEITUS—ON THE UNIVERSE, | 4 DISEASES IV, 20 |
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Text Figure 23 Biometeorogram of the Tuberculous Subject Discussed in the Text, Meteorogram (1) superimposed For detailed analysis see Reference 20

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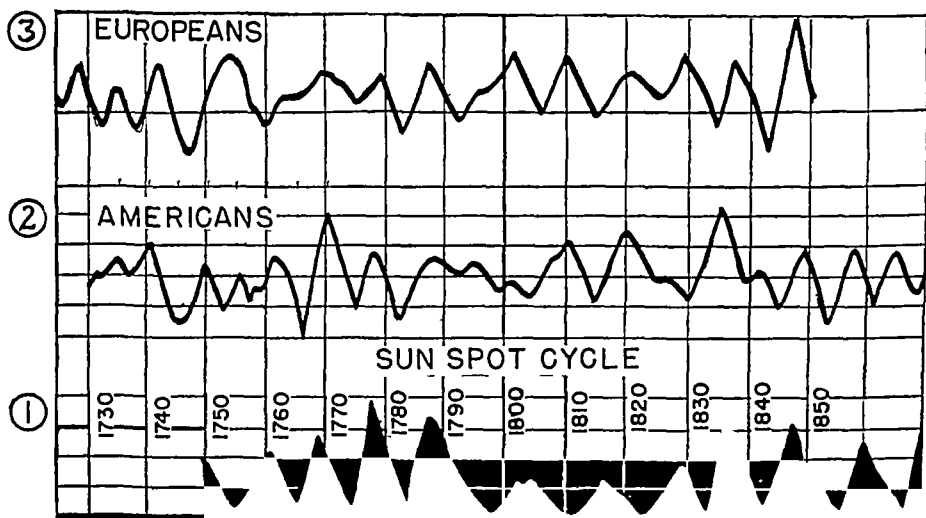


## RESUMPTION

### NOTE A—Genius and the Sun Spot Cycle

The clustering of genius has interested many observers. It appears to be in some way related to sun spot cycles and climatic variation.

A characteristic seasonal conception is clearly evident for unusual individuals. Ireland, in this country, noted this years ago, I published similar studies without knowledge of his previous work.



Text Figure 24 Curve 1 (Solid black profile) Sun Spot Numbers Observed at Zurich since 1750

Curve 2 (Line tracing) Birth Years of Outstanding Americans (7 year moving average adjusted for trends)

Curve 3 Birth Years of Outstanding Europeans (9 year moving average adjusted for trends)

Together with Alvin Mayne I have gathered some of the evidence for long-range periodicity for the period after 1700, making use of selections provided by the CENTURY CYCLOPEDIA OF NAMES (European) and the DICTIONARY OF AMERICAN BIOGRAPHY (American).

If genius represents deviation from the norm, the opportunity for greater production with spring conception would naturally be greater because of the organic instability of the time, associated with the environmental instability.

Similarly, different years may produce greater or lesser opportunity for the production of variants, or greater or lesser possibility for the greater destruction of certain types, or greater opportunity for survival of human types that might be biologically frail but mentally unusual.

Such differentiation might become evident when we study environmental relations, such as those characteristic of the sun spot cycle or environmental temperature cycles, as they may be related to the production of genius

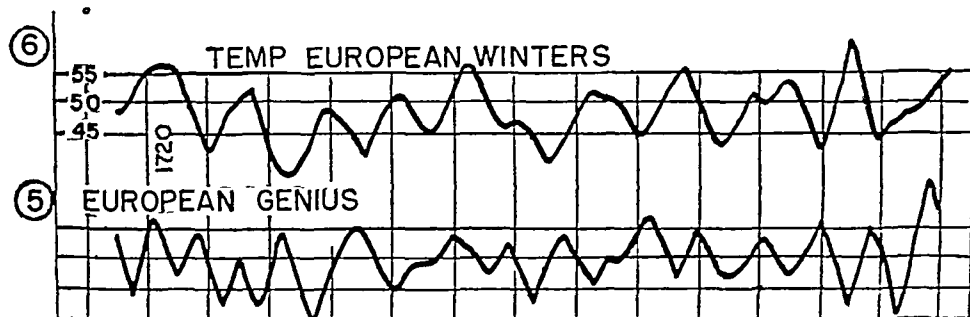
The graphs (Text Figures 24 and 25) will illustrate some of our findings

When we examine this text figure (24), it will be noted that apart from the period from 1800 to 1830 (when the sun spot activity was not in phase with the cold, wet years) there is a trend toward an increase in the production of genius with greater solar turbulence and that the curves for the production of outstanding Americans as well as Europeans have trends that are at times strikingly similar

When we examine Text Figure 25, it will be noted that periods when winter temperatures decline seem to be associated with the production of more outstanding persons

It must not be assumed that the environmental situation is the sole factor in the production of genius—on the contrary, there are many causes quite apart from the specific genetic inheritance. The periodicity of social disturbance and wars is one such which brings to attention and fame individuals who under normal conditions of peace would not be included in any selection of eminence. The problem is not a simple one and great reserve must be maintained in evaluating any one of the contributing factors

I have discussed some of the problems in *THE PATIENT AND THE WEATHER*, Volume III, in *LINCOLN—DOUGLAS, WEATHER AS DESTINY* (1943 Springfield), and in *SOME NEGLECTED FACTORS IN THE PERSONALITY-CULTURAL COMPLEX "GENIUS" AND "FATIGUE"* (Papers from the Second American Congress on General Semantics, 1941. Published 1943 P 141)



*Text Figure 25 Curve 5 Birth Years of Outstanding Europeans, 1715-1850  
Curve 6 Mean Winter Temperature for Europe*

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# Glossary

- ALLERGEN**—Substances that cause an allergic reaction in sensitized individuals Usually of animal or plant origin
- ANABOLISM**—The biological processes whereby more complex substances are built up as reserves (fats, carbohydrates, proteins) from the simpler components It is primarily reductive Anabolism and catabolism are interrelated and both oxidation and reduction occur at the same time
- ANAEROBIC**—Without air
- ANGINA**—Sore throat, probably often diphtheria in the Greek texts
- ANOREXIA**—Lack of appetite for food
- ANOXIA**—Air hunger—the result of any interference with the air (oxygen) supply to the tissues
- ANTHROPOLOGY**—The study of man
- ANTITOXIN**—The biological agent produced by the body to neutralize a specific toxin (poison) of bacterial, animal or plant origin
- APHTHA**—A disease characterized by round, pearl-like flakes in the mucous membranes of the mouth, caused by thrush
- ARCTURUS**—(Bear-guard ) The great fixed star in the constellation Bootes
- ASCITES**—Fluid accumulation in the abdominal cavity
- ASCLEPIADAEE**—The Guild or Brotherhood of Greek Physicians There being no legal qualification for the practice of medicine, control was in some measure exercised by the force of professional approval or disapproval
- ATTENUATION**—Lessening
- AURORA BOREALIS**—The luminous radiance of the atmosphere when electrified particles are projected into the upper (and possibly even lower layers) of the atmosphere as a result of solar eruptions, thereby exciting the molecules and atoms The effect is analogous to the activation of the Neon light
- AUSCULTATION**—Auditory examination of the surface for normal or abnormal sounds from the deeper tissues
- AUTONOMIC** — The self-regulatory mechanisms of organic control, including chemical, physical, endocrine, nervous, etc components
- BACTERIOLYSIS**—Dissolution of bacteria
- BILIOUS**—The constitutional type that is hot and dry, irritable, choleric
- BIOGRAM**—Graphic portrayal of observations made on an organism
- BORBORYGMUS**—The rumbling sound of intestinal gases due to peristaltic movement
- BUFFERS**—The chemical substances that can neutralize and balance any excess, as, for instance, an excess of hydrogen ions
- CARBUNCLE**—An acute painful pyogenic infection of the skin and subcutaneous tissues
- CARIES**—Death of solid structures, particularly bone

- CASEOUS—The soft, putty-like dead tissue of the tubercle
- CASSITERIDES—The Tin Islands (presumably Cornwall), in the north Atlantic
- CATABOLISM—The biological processes involved in the breakdown of more complex substances (reserves) with resulting freeing of energy for the use of the organism  
It involves the process of oxidation
- CHIAN BOOT—So named from the great commercial city of Chios, the boot extended half way up the leg
- CHOLERIC—Hot, fiery, impetuous, irascible, bilious (liver bile)
- CO<sub>2</sub>—Carbon Dioxide, the gaseous end product of carbon metabolism in the body, eliminated through the respiratory system
- COAGULATION—Consolidation, cohesion, taking form (as in the development of the embryo)
- COCTION—Boiling, ripening, digestion. Also used in the sense of detoxication with resulting restoration of tissue balance
- COMA—The state of being unconscious
- CONSOLIDATED—The tissues firm, filled with fluid or cellular exudate
- CONSTELLATION—The conjunction of a number of forces effective in concert, or in sequence, as assemblage of stimuli
- CONSTITUTION—Form and function in the framework of time, as related to the individual organism or to its environment
- COPIOUS—Abundant
- CORD—The spinal cord
- CORRUPTION—Disturbance
- COS—Famous Greek health resort and medical center, one of the small islands in the Dodecanesian group off the coast of Asia Minor, halfway station to Egypt, to Crete, etc
- COSMOS or MACROCOSMOS—The organized Universe
- CROTON—Greek colony in Southern Italy, the seat of an early medical school
- CUPPING—Drawing blood or fluid to the surface by means of a suction cup
- CYTOPLASM—The non nuclear portion of the cell
- DEPLETION—The removal of an excess
- DIPLOAE—The cavernous sinuses of the skull bones
- DIURNAL—Pertaining to the day
- DOG DAYS—The period from about the first part of July to September, the sultry period of summer—a malignant period
- DOG STAR (SIRIUS)—Its heliacal rising (i.e., far enough in front of the sun to be visible before dawn) often accompanied by great sultriness of the Mediterranean 'dog days'
- DOGMA—Established opinion, a code of authoritative tenets
- DROPSY—The excessive fluid in the tissues and cavities of the body  
Edema
- DURA—The firm membrane surrounding and supporting the brain tissue
- DISCRASIA—Disturbance or unbalance of the fluid constituents of the body
- DYSPNŒA—Difficulty in breathing

- DYSURIA**—Painful urination
- ECOLOGY**—The study of the integration of organic form, involving time and place, the mutual interrelation of organisms and environment
- EFFECTOR**—Any energy impact (physical, light, heat, etc.)
- ELECTRO-ENCEPHALOGRAM**—The record of the changing electrical potential of the brain
- EMBROCATION**—To moisten and rub with a (warm) lotion
- EMPHYSEMATOUS**—"Blown up", air-containing, distended
- EMPIRICAL**—Depending on experience or observation
- EMPHYEMA**—Pus in the chest cavity
- ENDOCRINES**—The specific products of the glands of internal secretion, such as the thyroid and adrenal, important in the autonomic regulation of the organism
- EPIDEMIOLOGY**—The study of disease, particularly of infectious disease
- EPISTAXIS**—Nosebleed
- EQUINOX**—The day (spring and autumn) when day and night are equal in time
- EPIPHYSIS**—The growth center of the bone. In the long bones the location is at the ends
- ERYSIPELAS**—An acute streptococcus infection of the skin, mucous membranes, etc
- ETIOLOGY**—The cause of disease
- EXUDATE**—The fluid or semi-fluid effusion on the surface of an inflammatory area, or into an enclosed cavity
- FIRE**—Summer (as a seasonal concept), energy, catabolism
- FISTULA**—A superficial communication with deeper tissues
- FOCUS**—The localized area of tissue dysfunction or disease
- FOMENTATION**—The application of a warm moist dressing
- "FRONT"**—The foremost border or interface between two air masses of different character as, for instance, tropical or polar air (First used by Hippocrates)
- GENETIC**—The hereditary mechanisms of the cell (and total organism) involving the nuclear structures (chromosomes and genes), these transmitted in the germ cells (sperm and egg), reproduce the individual characteristics of the parents
- GENOPHASE**—The organic forms conditioned by the genetic mechanism
- HABITUS**—Body form or proportion, the kind of person, the constitution
- HADES** (as a time concept)—Night, the surface of the sphere that is turned from the sun
- HEARTBURN**—Hyperacidity of the stomach, discomfort associated with acid eruction, etc
- HEMATOPOETIC**—Blood forming
- HEMOGLOBIN**—The iron-containing pigment of the red blood corpuscles which carries oxygen from the lungs to the tissues
- HEMOPTYSIS**—Bleeding from the lungs
- HISTAMINE**—A physiologically active,

- nitrogen-containing product of cellular metabolism, effective in dilating small blood vessels
- HOLISM**—The term used by a group of South African biologists (Smuts, Bews) to express an integrated concept of the organic world and particularly the view of man as related to the total environment
- HORMONE**—The specific product of certain tissues (glands of internal secretion) effective in coordinating bodily activities
- HUMOURS**—The fluid constituents of the body, symbolized by blood, bile (yellow and black), and phlegm
- HYDRATION**—Fluid excess The fluid balance between the vascular beds (blood, lymph, etc ) and the cellular elements is maintained by constant exchange of water, both free and bound Hydration and dehydration are opposite poles of this balance
- HYDROTHORAX**—Fluid accumulation in the chest cavity
- HYPOCHONDRIUM**—The abdomen below the ribs
- HYPOMANIC**—Excited stage of mental disturbance
- ICHOR**—A foul exudate associated with dead tissue
- IDIOPATHIC**—An inherent factor in disease causation
- ILLIBERAL**—Unorthodox
- LACHRYMATION**—Tearing
- LEPTOSOME**—A constitutional type characterized by slender body proportions
- LESION**—An injury to the tissues
- LEUKOPHLEGOMATIC**—White, pale, cold
- LIPOIDS**—Fat-like substances, some with the property of solution in either water or fats
- LOCUS MINORIS RESISTANTIAE**—Tissue area of greater sensitivity or lessened resistance
- LUXATION**—Dislocation
- MACROCOSMOS**—See Cosmos
- MALFORMATION**—Disturbance of growth at various stages of embryonic development, ranging from total absence of an organ or organ parts, to minor defects, due to true genetic (hereditary) or non-hereditary forces effective early in development
- MELANCHOLIC**—The person stigmatized by "black bile"
- METABOLISM**—The biochemical processes of the body, involving both the constructive as well as the destructive mechanisms incidental to life
- METEOROLOGY**—The study of weather (First used by Hippocrates )
- MIASMA**—Noxious influence of the atmosphere
- MICROCOSMOS**—The human organism
- MICTURATION**—Urination
- MIGRAINE**—Serious unilateral headache, with associated symptoms in other organs
- MILIEU**—Environment, setting, the medium
- MORPHOLOGICAL**—Pertaining to structure
- 'MOTION'**—Change in state
- NECROSIS**—Death of tissue

- OMENTUM**—The apron-like fold of tissue spread over the abdominal viscera
- ORGANISM**—The human, may be used to designate any living unit as, for instance, a bacterium
- PALAESTRA**—The public gymnasium and training school of the upper class youth
- PARAPHRASE**—The organic form as conditioned by environmental forces
- PATHOGENIC**—Disease-producing
- PATHOLOGICAL**—The altered (sick) organic processes of the body
- PERCUSSION**—Tonal response of tissue to superficial tapping by finger or instrument
- PERIPATETIC**—Wandering from place to place The period of training of the young physician when he travelled from city to city
- PERIPHERAL**—Marginal, outside as, for instance, the extremities, the skin, etc
- pH**—The symbol used to express the relative balance of hydrogen (acid) and hydroxyl (basic) ions Lowering of pH means relative acidity, increase of pH, relative alkalinity
- PHENOMENON**—An observed fact or event
- PHLEGMATIC**—Cold, moist, slow  
Typified by mucous or phlegm
- PHLYCTENA**—A flat skin eruption
- PHRENITIS**—Frequently used to designate brain fever
- PHTHISIS**—Consumption, tuberculosis
- PHYSIOLOGICAL**—The normal organic processes of the body (biochemical, biophysical, etc )
- PHYSIOGNOMICS**—The study of the face to determine temperament, character, disease manifestations, etc
- PHYSIS**—Nature's power to heal, i e , to restore an equilibrium that has been disturbed
- PLEIADES**—The heliacal rising of the Pleiades marked the beginning of summer, winter began with the cosmic setting of the Pleiades
- POLIOMYELITIS**—Infantile paralysis
- PROGNOSIS**—Foretelling the outcome
- PROTOZOA**—Single-celled organism, largely aquatic, and usually too small to be visible to the naked eye  
The organism that causes malaria is a protozoan
- PSYCHOPATHIC**—Mentally disturbed
- PUTREFACTION**—Decay, the death of tissue, with concomitant growth of putrefactive bacteria
- PYKNIC**—A constitutional type characterized by stout, fat, squat, roundish body proportions
- RESOLUTION**—The organic process of removing an inflammatory exudate of rapid digestion or solution (as in pneumonia)
- RETINA**—The structure of the eye sensitive to light
- RHONCHI**—Coarse and rough breath sounds due to mucous excretion in the bronchial tubes
- SACRED DISEASE**—Epilepsy
- SACRUM**—The lowest bone of the spine
- SALIVATION**—Excess flow of saliva
- SANGUINE**—Flushed, reddish
- SAPROPHYTIC**—Parasitic bacterial



- camp-followers enjoying joint tenancy with the original invaders
- SCHIZOPHRENIA—"Split-personality," i e, the type of insanity occurring usually in younger individuals (dementia praecox, as a variety)
- SCOTOMA — Visual impression of flashing geometric figures, due to vascular disturbance
- SECUSION SOUND—The sound of splashing
- SENSORIUM—The entire sensory apparatus, sense organs such as the eye, ear, nose, skin, as well as the nerve centers
- SEPTIC—Poisoned
- SEQUESTERED—To cast off or separate, as for instance, pieces of dead bone
- SEX RATIO—Proportion of males in terms of the females (M/F)
- SOLSTICE—The point (winter and summer) when the sun is farthest south or north from the equator
- SPLANCHNOPERIPHERAL — Abdominal vs peripheral organs, i e, the balanced interplay of the functional state between the internal and external organs and vascular beds
- SPLENETIC—The constitutional type conditioned by too much 'spleen', malicious, peevish, fretful
- STARS—The position of the stars was used in lieu of our calendar and, as a result, the Greek was star conscious
- STERNUM—The breastbone
- SUPPURATION—Inflammatory reaction characterized by the formation of pus
- SYMPATICOTONIA—The organic state with preponderance of tone in the sympathetic nervous system, associated with increased blood pressure, etc
- SYNTHESIZE—To put together, for instance, build up a chemical compound
- SYNDROME—A group of symptoms or disease signs that occur together
- TENESMUS—Accentuation of effort at defecation
- TELEOLOGICAL—Relating to presumptive purpose or design in predetermined order
- TERRESTRIAL—Pertaining to the earth
- TETANUS—Infection with the tetanus bacillus, lockjaw
- THROMBOSIS—Clotting in the blood vessels
- TISSUE—The organic cellular and extracellular structures that compose the organisms
- TONE—The functional state of the tissues—normally balanced between repose and activity, i e, biotonus
- TRAINER—The instructor in the Palastra or public gymnasium
- TRAUMA—Injury (physical, mental, etc)
- TREPHINING—Boring through bony structures, such as the skull, with a trephine
- TUBERCLES—The inflammatory reaction or nodule caused by infection with the tubercle bacillus
- UMBILICAL CORD—The cord or "life line" connecting the maternal placenta and the fetus
- UNRIPENED—Consolidated, firm, undigested
- URTICARIA—Hives, an evanescent, itching skin eruption

- UNCOMPOUNDED — Not balanced, undigested
- UVULA—The pendent fleshy lobe at the middle of the free margin of the palate
- VARIX—Localized dilatation, usually of blood vessels
- VENESECTON—Cutting the vein, bleeding, a common therapeutic procedure in early medicine
- VIRUS—Disease producing organism of extremely small size, but visible in the electronic microscope
- VIS MEDICATRIX NATURAE—The natural healing powers of nature
- WATER—Winter (as a seasonal concept), matter, anabolism
- WEIGHT-LENGTH RATIO ( $W/L$  or  $W/L^3$ )—An indicator of body proportion, weight divided by the length or the length cubed
- ZEUS (as a time concept)—Day, the surface of the sphere illumined by the sun's rays



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The illustrative material that has been used is from Greek vase paintings, small plastics, and coins of the Hippocratic era For assistance in the selection I am under obligation to Miss Ethelred Abbot, Librarian of the Ryerson Library of the Art Institute of Chicago, to Miss Christine Alexander of the Metropolitan Museum of Art in New York, and to members of the staff of the Museum of Fine Arts in Boston To my friend, J Christian Bay, Librarian of the Crerar Library, I am, as usual, indebted for many kindnesses

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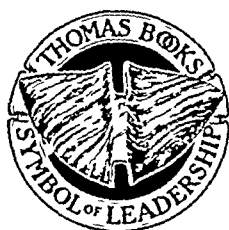


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# HIPPOCRATIC WISDOM

By WILLIAM F PETERSEN, M D

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